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Performance Based Planning Research

FINAL REPORT



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ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES PERFORMANCE BASED PLANNING RESEARCH

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PERFORMANCE BASED PLANNING RESEARCH

METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS					APPROXIMATE CONVERSIONS FROM SI UNITS				
Symbol	When You Know	Multiply By	To Find	Symbol	Symbol	When You Know	Multiply By	To Find	Symbol
<u>LENGTH</u>					<u>LENGTH</u>				
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ft	feet	0.3048	m	m	meters	3.28	feet	ft	
yd	yards	0.914	m	m	meters	1.09	yards	yd	
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oz	Ounces (avdp)	28.35	grams	g	g	grams	0.0353	Ounces (avdp)	oz
lb	Pounds (avdp)	0.454	kilograms	kg	kg	kilograms	2.205	Pounds (avdp)	lb
T	Short tons (2000 lb)	0.907	megagrams	mg	mg	megagrams (1000 kg)	1.103	short tons	T
<u>VOLUME</u>					<u>VOLUME</u>				
fl oz	fluid ounces (US)	29.57	milliliters	mL	mL	milliliters	0.034	fluid ounces (US)	fl oz
gal	Gallons (liq)	3.785	liters	liters	liters	liters	0.264	Gallons (liq)	gal
ft ³	cubic feet	0.0283	meters cubed	m ³	m ³	meters cubed	35.315	cubic feet	ft ³
yd ³	cubic yards	0.765	meters cubed	m ³	m ³	meters cubed	1.308	cubic yards	yd ³
Note: Volumes greater than 1000 L shall be shown in m ³									
<u>TEMPERATURE (exact)</u>					<u>TEMPERATURE (exact)</u>				
°F	Fahrenheit temperature	5/9 (°F-32)	Celsius temperature	°C	°C	Celsius temperature	9/5 °C+32	Fahrenheit temperature	°F
<u>ILLUMINATION</u>					<u>ILLUMINATION</u>				
fc	Foot-candles	10.76	lux	lx	lx	lux	0.0929	foot-candles	fc
fl	foot-lamberts	3.426	candela/m ²	cd/cm ²	cd/cm ²	candela/m ²	0.2919	foot-lamberts	fl
<u>FORCE and PRESSURE or STRESS</u>					<u>FORCE and PRESSURE or STRESS</u>				
lbf	pound-force	4.45	newtons	N	N	newtons	0.225	pound-force	lbf
psi	pound-force per square inch	6.89	kilopascals	kPa	kPa	kilopascals	0.145	pound-force per square inch	psi
These factors conform to the requirement of FHWA Order 5190.1A *SI is the symbol for the International System of Measurements									

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SUMMARY REPORT | JULY 2020



ALASKA DEPARTMENT
OF TRANSPORTATION
& PUBLIC FACILITIES

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Performance Based Planning Research

FINAL SUMMARY REPORT

Prepared for:

ALASKA DEPARTMENT
OF TRANSPORTATION
& PUBLIC FACILITIES

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ACRONYM LIST

AADT	Annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
ATIA	American's Transportation Infrastructure Act
AzDOT	Arizona Department of Transportation
CAADT	Commercial annual average daily traffic
CPRT	Capital programs review team
CRFC	Critical rural freight corridors
CTB	Commonwealth Transportation Board (VA)
CUFU	Critical urban freight corridors
DOT	Department of Transportation
DOT&PF	Alaska Department of Transportation & Public Facilities
FAST Act	Fixing America's Surface Transportation Act
FDOT	Florida Department of Transportations
FFY	Federal fiscal year
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HSIP	Highway Safety Improvement Program
IM Program	Interstate Management Program (PennDOT)
ITS	Intelligent transportation system
LRTP	Long-range transportation plan
MAP-21	Moving Ahead for Progress in the 21st Century Act
MnDOT	Minnesota Department of Transportation
MPO	Metropolitan planning organization
NCDOT	North Carolina Department of Transportation
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NHFP	National Highway Freight Program
NHPP	National Highway Performance Program
NHFN	National Highway Freight Network
NHS	National Highway System
P2P	Plan to Program (AzDOT)
PEL	Planning and environmental linkages
PennDOT	Pennsylvania Department of Transportation
PHFS	Primary highway freight system
RPO	Regional planning organization
SSE	Scope, schedule, estimate
STC	State Transportation Commission (PA)
STIP	Statewide transportation improvement program
STP	Surface transportation program
TAC	Technical advisory committee
TAMP	Transportation asset management plan
TIP	Transportation improvement program
TRB	Transportation Research Board
TYP	PennDOT Twelve-Year Program
VDOT	Virginia Department of Transportation



EXECUTIVE SUMMARY

The Alaska Department of Transportation & Public Facilities (DOT&PF) is responsible for developing the Alaska Statewide Transportation Improvement Program (STIP) to be eligible for federal transportation funding (Title 23 USC 135). As of September 2019, Alaska has 1,080 miles of Interstate and 887 miles of non-Interstate NHS roads. Except for about 23 miles, all are owned and operated by DOT&PF. Alaska has 415 bridges on the NHS, all owned and operated by DOT&PF. As part of the STIP development, DOT&PF nominates, evaluates and prioritizes projects within fiscally-constrained funding limits for inclusion in the STIP. In 2017, DOT&PF developed data-based ranking criteria to score National Highway System (NHS) projects that are funded by the National Highway Performance Program (NHPP): safety, pavement condition, bridge condition; and traffic. The criteria provide a more data-driven structure for project comparison but proved insufficient to handle projects of varying intent, size, geographical location, and project readiness. They also do not comprehensively address federal performance-based planning and programming requirements nor the federally required and recently adopted transportation asset management plan. Further complicating the process, the current STIP has an estimated backlog of 10 to 11 years of active, non-recurring projects, making it challenging to add any new projects to the fiscally constrained four year program.

DOT&PF retained Kittelson & Associates, Inc. to research best practices and recommend a more transparent, comprehensive process for STIP project prioritization and programming related to NHPP funding and the NHS. The research scope included the following tasks:

- Understand DOT&PF current practices and policies to determine what is working well and where there is room for improvement
- Research national best practices for STIP nominations, evaluation criteria, and scoring
- Identify how national best practices can be adapted and applied to the unique Alaskan conditions to better select projects in a transparent, equitable process that aligns with the intent of federal requirements
- Make recommendations for implementation consistent with an applied research effort which is intended to produce implementable solutions that address problems faced by transportation practitioners and managers

A technical advisory committee (TAC) including representatives from Statewide Program Development and each DOT&PF region (Northern, Central and Southcoast) collaborated with the project team through an iterative process that consisted of a series of technical memorandums that eventually became the final report. Each technical memorandum was provided to the TAC for review. After a minimum two-week review period, a TAC meeting was held to discuss feedback. Final comments were accepted up to one week after each TAC meeting, at which time technical memorandums were finalized and distributed.

The report is outlined for the reader by first specifying federal requirements, followed by a summary of existing DOT&PF practices. It then outlines applicable best practices from other states evaluated during the literature review process and identifies revised project evaluation criteria and implementation recommendations for DOT&PF as an outcome of this applied research project. These key implementation recommendations are summarized on the following page.



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Below is a summary of steps that should be considered for implementation for a more transparent, equitable, and fiscally-constrained process. The steps consider the current state of data, systems, and Transportation Asset Management Plan targets, resources. They are based on a review of existing DOT&PF processes, national best practices and stakeholder input.

- Develop and align a **“family of transportation plans”** that directly link statewide goals and planning to project prioritization, and programming.
- Develop an **investment or funding allocation plan** that is flexible to agency constraints and has an intentional link to planning and programming, aligning with the statewide Long-Range Transportation Plan (LRTP) and Transportation Asset Management Plan (TAMP).
- Implement a **project identification and screening process** to identify the full range of possible projects and screen for eligibility and unity with the statewide vision/long-range transportation plan before they move to the scoring process.
- Use **project criteria** to score and prioritize projects using data-driven quantitative and qualitative performance metrics. Metrics are outcome-based and link back to the LRTP and TAMP. Re-evaluate criteria and weighting in each STIP cycle.
- Develop and dedicate resources to maintain a **data management plan and evaluation tools** to improve decision-making and share data accessibly with the public and stakeholders.
- Integrate **performance-based planning and programming** throughout all multimodal transportation plans.
- Develop and regularly update **guidance manuals and checklists** to standardize the STIP process across regions.
- Work with the public, metropolitan planning organizations (MPOs) and other planning partners to establish a **transparent, well-documented** decision-making process.

NEAR TERM IMPLEMENTATION STEPS

Near term implementation steps take into account the current state of data, systems, TAMP targets, and available resources. These steps are intended to occur prior to and during the next STIP cycle.

1. Use an open, collaborative process with stakeholders and MPOs to:
 - ☑ Develop and implement a project pre-screening checklist to determine if a project is eligible for nomination for the current STIP cycle.
 - ☑ Develop and implement a project nomination application that requires standardized information for all eligible projects.
 - ☑ Refine definitions and implement new project categories to bundle projects logically, so comparable projects compete with one another:
 - State of Good Repair
 - Modernization
 - Capacity Expansion
 - Major Capacity Expansion
2. Assess data currently in the GIS-based Roads and Highways Geodatabase and identify data across business areas that can be immediately added to the geodatabase in support of a consistent STIP project evaluation process and the evaluation criteria. Document data gaps.
3. Identify initial criteria to be used for project prioritization that can be scored using the same set of data for all projects, across all regions.



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LONGER- TERM IMPLEMENTATION STEPS

These steps are intended to occur over the next two to five years.

1. Develop an interim funding allocation plan for each project category using scenario-based planning to optimize investments.
2. Continue to refine project evaluation criteria and weighting based on data availability, changing goals and investment strategies.
3. Develop a STIP manual that outlines procedures for roles and responsibilities, project nomination, scoring and weighting, approved data sources, and public and stakeholder engagement.
4. As part of the next LRTP revision in 2021, integrate performance-based planning and programming best practices including a statewide investment strategy to achieve goals and performance targets.
5. Based on the LRTP outcomes, update:
 - ☒ The funding allocation plan
 - ☒ The TAMP
 - ☒ STIP project ranking criteria and weighting
6. Develop an in-house GIS-based evaluation/scoring tool to evaluate weighting and investment scenarios.
7. Publish STIP information on a user-friendly external webpage.



PLANNING CONTEXT

Federal

Federal laws guide the STIP process when federal highway dollars from the NHPP and the National Highway Freight Program (NHFP) are used for transportation investments.

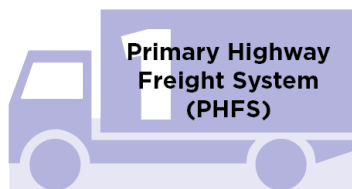
THE PURPOSES OF NHPP

Provide support for the **condition and performance** of the NHS

Provide support for the **construction of new facilities** on the NHS

Ensure investments of federal-aid funds in highway construction support progress towards **achieving performance targets** in a State's asset management plan for the NHS

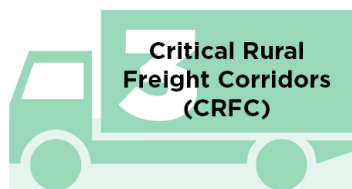
NHPP funds may only be obligated for a project on an "eligible facility". An eligible facility is a project, part of a program of projects, or an eligible activity supporting progress toward the achievement of one or more national performance goals. These national performance goals include improving infrastructure condition, safety, congestion reduction, system reliability, or freight movement on the NHS. Projects must be identified in the STIP and be consistent with the LRTP and MPOs' transportation plans.



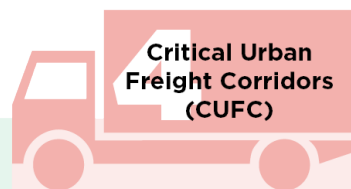
This is a network of highways identified as the most critical highway portions of the U.S. freight transportation system, designated by FHWA.



These highways are the remaining portion of Interstate roads that provide important continuity and access to freight transportation facilities.



These are public roads not in an urbanized area which provide access and connection to the PHFS and the Interstate with other important ports, public transportation facilities, or intermodal freight facilities. States designate CRFCs.



These are public roads in urbanized areas which provide access and connection to the PHFS and the Interstate with other ports, public transportation facilities, or intermodal transportation facilities. In an urbanized area with a population of less than 500,000, the state, in consultation with the MPO, designates CUFCs.



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The purpose of the NHFP is to improve efficient movement of freight on the National Highway Freight Network (NHFN) which includes:

NHFP funds may be obligated for projects that contribute to the efficient movement of freight on the NHFN. A state may not obligate NHFP funds unless it has developed a freight plan that is consistent with 49 U.S.C. 70202. Projects must also be identified in the STIP and consistent with the LRTP and MPOs' transportation plans. Alaska has PHFS mileage greater than or equal to 2 percent (calculated as the proportion of total designated PHFS state mileage to the total mileage of the PHFS in all states). Alaska is therefore considered a high mileage state with respect to the PHFS and may obligate funds for projects on the PHFS, the CRFC, and the CUFC.

Fixing America's Surface Transportation Act

The FAST Act expires September 30, 2020. A bill, America's Transportation Infrastructure Act (ATIA) was introduced to reauthorize the Federal-aid Highway Program for five years at record investment levels to maintain and repair roads and bridges and to keep the economy moving. The legislation includes provisions to improve road safety, accelerate project delivery, improve resiliency to disasters, and reduce highway emissions. The multi-year highway-transit bill is still in debate and final provisions may change funding allocations, programs, and processes.

On December 4, 2015, President Barack Obama signed Public Law 114-94, the Fixing America's Surface Transportation Act (FAST Act). The FAST Act continues the NHPP, which was established under the Moving Ahead for Progress in the 21st Century Act (MAP-21) enacted in 2012.

The FAST Act also continues the requirements for a long-range plan and a short-term transportation improvement program (TIP) that use a performance-based approach to make transportation decisions and support the national goals described in 23 U.S.C. 150(b) and the general purposes described in 49 U.S.C. 5301. [23 U.S.C. 135(d)(2)(A)].

- Achieve a significant reduction in traffic fatalities and serious injuries on all public roads
- Maintain the highway infrastructure asset system in a state of good repair
- Achieve a significant reduction in congestion on the NHS
- Improve the efficiency of the surface transportation system
- Improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development
- Enhance the performance of the transportation system while protecting and enhancing the natural environment
- Reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project



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development and delivery process, including reducing regulatory burdens and improving agencies' work practices. [23 U.S. Code § 150]

***Performance measures and targets** must be established and monitored that relate to safety, bridge and pavement condition, air quality, freight movement, and performance of the NHS system.*

The FAST Act requires developers of transportation plans and programs to consider 10 planning factors:

1. Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.
2. Increase the safety of the transportation system for motorized and non-motorized users.
3. Increase the security of the transportation system for motorized and non-motorized users.
4. Increase accessibility and mobility of people and freight.
5. Protect and enhance the environment, promote energy conservation, improve quality of life, and promote consistency between transportation improvements and State and local growth and economic development patterns.
6. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.
7. Promote efficient system management and operation.
8. Emphasize the preservation of the existing transportation system.
9. Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts to surface transportation; and
10. Enhance travel and tourism.

The FAST Act also requires each state to develop a state freight plan, both immediate and long-range. The plan must cover a five-year forecast period, be fiscally constrained, and include a freight investment plan with a list of priority projects. Plans must be updated at least every five years (49 U.S.C. 70202(e)).



State of Alaska Plans



In addition to the federal regulation (23 CFR 450.214), Alaska Statute (AS 44.42.050) requires a "comprehensive, intermodal, long-range transportation plan" for the state that addresses all modes of transportation and provides a clear link between policy, planning, evaluation, and transportation investments. DOT&PF plans that implement federal and state requirements related to federally funded NHS transportation are summarized below.

Statewide Long-Range Transportation Plan

The DOT&PF LRTP—Let's Keep Moving 2036 Policy Plan Update (2016) establishes transportation policies, goals, and implementing actions for highways, aviation, transit, rail, marine, bicycle, and pedestrian transportation through the year 2036. The plan does not list specific investment strategies, projects or costs. Goals and actions are categorized into the following policy areas:

1. **New Facilities.** Develop new capacity and connections that cost-effectively address transportation system performance.
2. **Modernization.** Make the existing transportation system better and safer through transportation system improvements that support productivity, improve reliability, and reduce safety risks to improve performance of the system.
3. **System Preservation.** Manage the Alaska Transportation System to meet infrastructure condition performance targets and acceptable levels of service for all modes of transportation.
4. **System Management and Operations.** Manage and operate the system to improve operational efficiency and safety.
5. **Economic Development.** Promote and support economic development by ensuring safe, efficient, and reliable access to local, national, and international markets for Alaska's people, goods, and resources, and for freight-related activity critical to the State's economy
6. **Safety and Security.** Improve transportation system safety and security
7. **Livability, Community and the Environment.** Incorporate livability, community, and environmental considerations in planning, delivering, operating, and maintaining the Alaska Transportation System
8. **Transportation System Performance.** Ensure broad understanding of the level, source, and use of transportation funds available to DOT&PF; provide and communicate the linkages between this document, area transportation plans, asset management, other plans, program development, and transportation system performance



Statewide Transportation Improvement Program (STIP)

The STIP is a statewide prioritized listing/program of transportation projects that is required for projects to be eligible for federal funding (23 USC 135). The STIP must meet the following requirements.

- Projects in the STIP must be consistent with, and implement, the policies in the LRTP
- Cover a period of at least four years, if the STIP covers more than 4 years, the FHWA will consider the projects in the additional years as informational
- Include all FHWA and Federal Transit Administration (FTA)-funded and regionally significant projects
- Be fiscally constrained to assure project costs do not exceed available estimated revenues
- Be consistent with other required transportation plans
- Follow a public involvement process to consult and coordinate with tribes, MPOs, municipalities, and communities
- Include a 45-day public comment period for a new STIP or a 30-day comment period for an amended STIP
- Be approved by FHWA and FTA

The STIP may:

- Be modified due to changes in project schedules and estimates
- Include non-federally-funded projects
- Include additional projects that could proceed if additional funding becomes available. The additional projects constitute the “illustrative” list of projects allowed under federal regulation 23 CFR 450.216(l). If a project is selected from the illustrative list to move ahead, it must receive formal approval action from the FHWA or FTA before work can proceed.

The STIP modification process must follow procedures established in state and federal laws. All revisions have specific approval, review and public notice requirements; all are reviewed, tracked and approved by DOT&PF, FHWA, and FTA. There are three main types of STIP revisions:

- **Amendment:** Required when adding or removing a project, when there is a significant funding change or a major change in fund scheduling, or when adding a phase or making major changes to the project description. DOT&PF provides notice of a proposed amendment by publishing a notice in a newspaper and by written notice to MPOs, tribes and others affected by the amendment. There is a 30-day comment period following publication of the notice.
- **Administrative Modification:** An administrative modification is an informal revision of the STIP where the changes are minor and public notification is not required. An administrative modification may not affect fiscal constraint. Administrative modifications do not require FHWA or FTA approval.
- **Incorporation by Reference:** Transportation Improvement Programs (TIPs) are incorporated into the STIP by reference. Typically, TIPs are from MPOs and federal agencies, such as Western Federal Lands and the Bureau of Indian Affairs.









Transportation Asset Management Plan (TAMP) and FAST Act Performance Targets

Each state is required to develop a TAMP to improve or preserve the system's performance and the condition of its assets. (23 U.S.C. 119(e)(1), MAP-21 § 1106). The asset management plan shall, at a minimum, include:

- A summary listing of the pavement and bridge assets on the NHS, including a description of the assets' condition
- Asset management objectives and measures
- Performance gap identification
- Life cycle cost and risk management analysis
- A financial plan
- Investment strategies

States are also required by 23 CFR 490.105 to set NHS pavement condition targets for Interstate and non-Interstate inventory. The DOT&PF June 2019 TAMP is a 10-year financial plan connecting the LRTP and STIP for NHS bridges and pavements only. It describes how DOT&PF will manage the NHS in a state of good repair by achieving national goals and state-set targets.

TAMP Pavement and Bridge Condition Targets					
Interstate Pavements:		Non-Interstate NHS Pavements:		Bridges:	
					
10%	20%	15%	15%	10%	40%
POOR	GOOD	POOR	GOOD	POOR	GOOD

DOT&PF is also required to develop and report on performance measure targets in accordance with the FAST Act. FHWA will assess biennially whether each state is showing significant progress in achieving established targets for the NHPP. State progress would be considered significant if the actual condition is either equal to or better than the established target, or better than the baseline condition. Failure to meet the minimum target levels can subject a state to penalties. DOT&PF targets are summarized on the following page.



FAST Act – Alaska Performance Targets

Highway Safety	Highway Infrastructure Condition	Highway Reliability	Emission Reductions
70.4	39.4%	1.84	0.05
Fatalities (5-year average)	Bridges in Good Condition (NHS)	Truck Travel Time Reliability Index (interstate highways)	NOx Emissions (kg/day) Reduced through CMAQ projects, 4-year cumulative

STIP NHS EXISTING PROJECT SELECTION PROCESS

This overview of the current STIP project selection process is based on a review of project scoring and selection materials from 2017 and 2018 including meeting summaries, scoring sheets and stakeholder interviews. The interviews were conducted in August 2019 with DOT&PF staff historically engaged in the process. In summary, the design and administration of the current project selection process produces a competitive environment among the DOT&PF regions because it does not clearly acknowledge and balance the different legitimate needs within each region. Some stakeholders indicate the STIP should have more small, discrete projects to meet statewide needs and not all the money can be spent in one region. Other stakeholders stated that a significant portion of funding should be spent on the highest volume roadways in the most populated areas and alternative funding sources should be found for lower volume NHS projects.

Areas of Agreement

- Using a data driven selection process for the initial scoring has been positive.
- A standardized, more transparent process from project nomination to scoring, ranking and selection should be implemented and followed by all regions.
- Existing criteria and scoring generally favor urban projects. Additional criteria may result in a more balanced STIP program.
- To the extent practical, project elements that are consistently identified as “unique benefits” should become actual scoring criteria for transparency and consistency. There will continue to be a need for a “balancing meeting” to determine project selection for inclusion in the STIP as not all unique project elements can be captured by scoring criteria.



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Key Challenges

- Determining how many additional projects are reasonable to include in the STIP, and at what scale (cost). If no new projects are accepted, then newly failing pavements of any volume can't be funded.
- Resolving differing opinions between Statewide, Southcoast, Northern and Central regions on how to address the geographic distribution of projects such that the entirety of the NHS system is maintained.
- Assessing if ranking criteria can be used to address the need to spend money in the near term on smaller projects to prevent bigger issues in the future.
- Resolving data management issues to provide easily accessible and consistent data for project scoring and providing a database to track STIP projects for historical reference.

Opportunities Moving Forward

Opportunities represent areas where the DOT&PF could, in the near term, address many of the above challenges that would facilitate implementation of a more data driven project selection process.

- Standardize the project nomination form and scope, schedule and cost estimates prepared for all projects.
- Identify specific data management systems of record and stipulate a consistent protocol for gathering data to inform project scoring.
- Provide additional data-based evaluation criteria that can differentiate projects and help to address rural versus urban needs.
- To the extent practical, "unique benefits" should become measurable criteria.

Exhibit 1 highlights key milestones in the current STIP process.



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Exhibit 1. Current Alaska DOT&PF STIP Project Selection Process

LONG-RANGE TRANSPORTATION PLAN

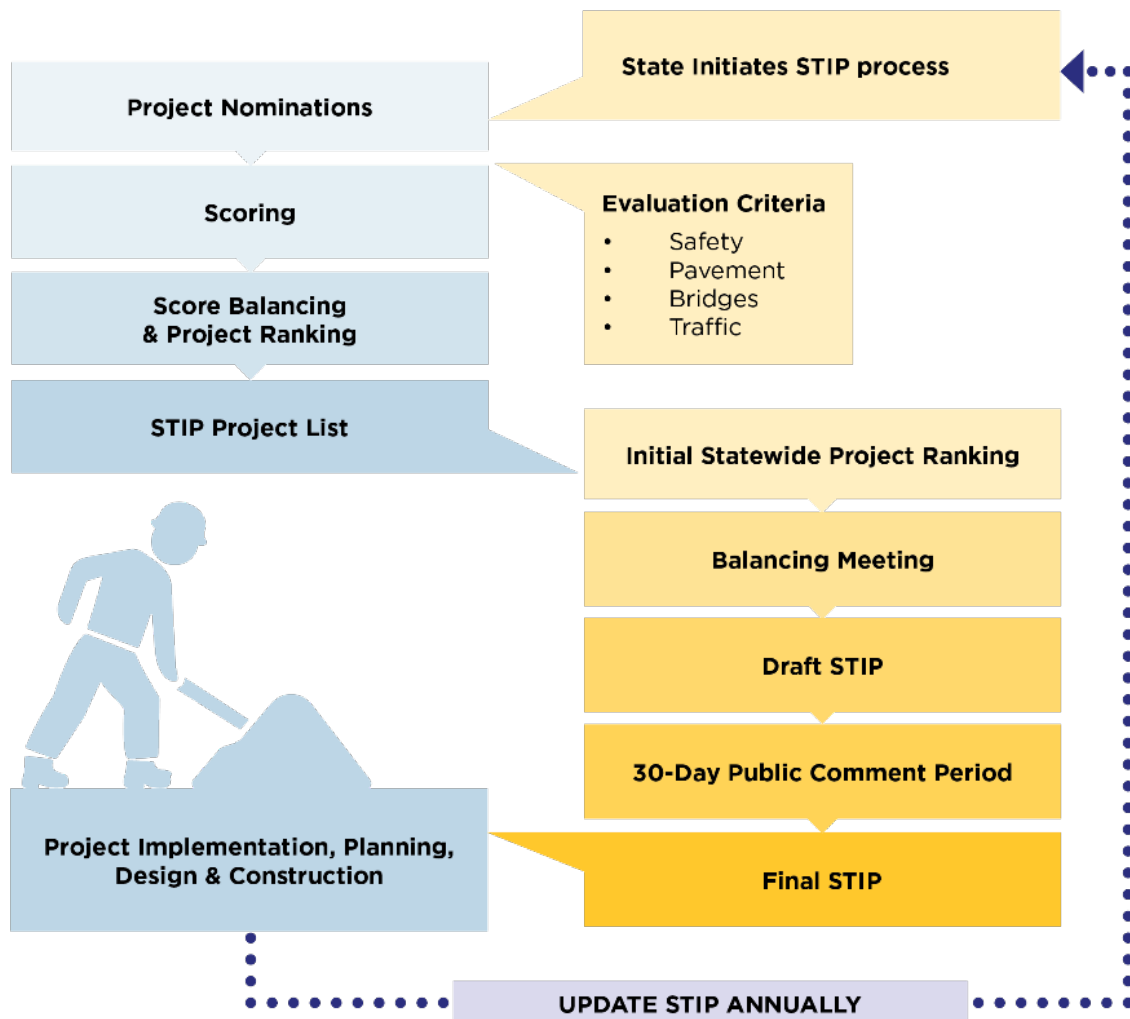


STATEWIDE TRANSPORTATION IMPROVEMENT PLAN

REGIONS



STATEWIDE PLANNING





Existing Project Nomination Process

Statewide Planning initiates the STIP process by providing each region with NHPP scoring worksheets and instructions. There is no standardized nomination form or project identification process for each region to follow. As a result, the nomination process varies somewhat by region. Based on stakeholder interviews, initial projects are self-nominated by region and identified through:

- Institutional knowledge of the transportation network
- Coordination between regional leadership and representatives from Planning and Preconstruction
- Input from Maintenance & Operations, Traffic Safety and Engineering, and Statewide Pavement and Bridge to identify NHS facilities with the highest safety and maintenance concerns
- Legislative requests

As part of this process, existing NHPP STIP projects are updated to reflect changes in the amount of funding required and scheduling.

NHS preservation projects (1R) are treated separately. Each region has a "Pavement and Bridge Rehabilitation" line-item in the STIP. The preservation projects are fiscally constrained but not tied to NHPP project scoring/ranking/selection. Funding for preservation projects is negotiated by the regions.

Stakeholder Feedback

There was general agreement that a formal nomination process would result in more consistent project information across regions and facilitate comparisons among projects. There is also agreement that the NHS serves communities across the state and the system must be maintained. There is disagreement on how to address geographic challenges and balance rural and urban needs. FHWA reports that they expect to see both urban and rural projects in the STIP. This has become a nationally recognized concern and rural representation as part of the federally funded program is desired. Rural NHS project representation is also necessary to achieve TAMP targets. Other key challenges noted included:

- The life cycle of a project cannot currently be tracked in a single dataset. This requires decision-makers to have to rely on institutional knowledge regarding past investments.
- Project costs are not accurately represented in the planning phase. This is because sufficient information is not available or lower cost estimates are used as an advantage for project nomination into the STIP.



Existing Evaluation Criteria

The existing evaluation criteria are shown in Exhibit 2. The unique benefits or needs not otherwise reflected in these criteria have not historically been populated at the regional level; however, the 2018 scoring form included questions for regional leadership to address based on trends observed during the 2017 STIP process:

- *Does the project address geotechnical concerns?*
- *Is the project located on a safety corridor, interstate or designated freight route?*
- *Is the project recommended by any transportation plan or studies?*
- *Does the project leverage funds or support the transfer of a facility?*
- *Is this a high-profile project?*
- *Are there any other unique benefits that haven't been captured in the scoring criteria?*

Stakeholder Feedback

There continues to be differing opinions between Statewide, Southcoast, Northern, and Central regions on how to equitably address geographic distribution of projects. For example, road system continuity is typically the primary driver for rural areas and operational performance/efficiency of existing infrastructure is typically the primary driver in urban areas. The criteria tend to be urban-centric and if the process were to be solely dependent on the evaluation criteria scoring, the majority of funds would be allocated to high volume NHS roadways in Central Region.

Southcoast and Northern regions would like to see evaluation criteria or a process that helps level the playing field so low volume NHS roadways providing important connections and/or continuity are also competitive. For example, the higher annual average daily traffic (AADT) and crash history for an urban roadway section is generally such that the same project could be submitted and scored for funding every few years while a lower volume rural project could go 30 years without ever scoring high enough to be programmed.



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Stakeholders were asked about other criteria that may be useful for project ranking and could be assessed as part of the review of other State's practices:

- ✓ Bridges and pavement – Need to make better decisions regarding replacement versus rehabilitation. For example, should improvements to bridges rated as “fair” be ranked higher to avoid the need for full replacement later? For pavement, there may be a need to address the underlying cause of failure.
- ✓ Does the proposed project implement adopted land use plans? This would help ensure individual projects are achieving articulated state and local visions.
- ✓ What is the impact on maintenance, short-term, long-term and during winter?
- ✓ Does the project improve a freight bottleneck route?
- ✓ Is the project in an area of projected population growth?
- ✓ Does the project create the potential for economic development?
- ✓ Can the environmental impacts be scored related to the National Environmental Policy Act (NEPA) – right-of-way acquisition, utility relocates, wetlands, historic preservation, parks, etc.
- ✓ What is the likelihood of public support?
- ✓ What is the timeline from planning to construction?
- ✓ Does the project address the economic impacts of load restrictions on freight movement?
- ✓ What is the level of historic spending – are the investments resulting in project longevity or is it being spent to address the same problem repeatedly?
- ✓ What is the cost of not doing the project, such as costs for maintenance, impacts to communities, and the traveling public? Can ranking criteria address the need to spend money now to prevent bigger issues in the future?
- ✓ Is the project the highest volume road in the region?
- ✓ Does the project improve resiliency? What is the outcome of a vulnerability assessment? For example, is it the only road/NHS facility serving a community?
- ✓ What is the deliverability factor – time, cost, value?
- ✓ Project Cost. There is disagreement on cost as a criterion. At the planning phase, there isn't enough information available to generate accurate estimates and projects could be “low balled” to get on the STIP.



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Exhibit 2. 2017 & 2018 NHPP Evaluation Criteria

2017 & 2018 NHPP Evaluation Criteria					
Standards	10	8	5	3	1
Safety	Proposes mitigation which is recognized in practice to address safety issues for a route that qualifies based on HSIP* costs/mile of project length greater than \$5million/mile.	Proposes mitigation which is recognized in practice to address safety issues for a route that qualifies based on HSIP costs/mile of project length between \$3million/mile and \$5million/mile.	Proposes mitigation which is recognized in practice to address safety issues for a route that qualifies based on HSIP costs/mile of project length between \$2million/mile and \$3million/mile.	Proposes mitigation which is recognized in practice to address safety issues for a route that qualifies based on HSIP costs/mile of project length between \$1million/mile and \$2million/mile.	Proposes mitigation which is recognized in practice to address safety issues for a route that qualifies based on HSIP costs/mile of project length less than \$1million/mile. If no mitigation 0 pts.
Pavement Condition	35% pavement segments poor OR 1 of the following apply >50% segment IRI >170 >50% Cracking % >10 >50% segments Rut >4	20-34% pavement segments poor OR 1 of the following apply >35% segment IRI >170 >35% Cracking % >10 >35% segments Rut >4	10-19% pavement segments poor OR >75% segments are fair	50 to 80% of segments are mix of fair and poor	Less than 50% of segments are mix of fair and poor
Bridge	One rating is (deck, sub, super) is poor.	All three bridge ratings are fair.	Two ratings are fair. The other is good.	Seismic Upgrades needed OR, Functionally Obsolete	One rating is Fair. The rest are good.
Traffic	Route has greater than 6,000 AADT/lane	Route has between 4,500 and 6,000 AADT/lane	Route has between 2,500 and 4,500 AADT/lane	Route has less than 2,500 AADT/lane but more than 1,000/lane	<1,000 AADT/lane
Project exhibits UNIQUE benefits or needs NOT OTHERWISE RATED	Scores are to be assigned by Senior Management Basis for score must be documented.				
Section Asphalt Condition		Pavement's Three Metrics			
	3 metrics ratings (IRI, Crack, Rut)		IRI	%Crack	Rut (in)
Poor	2 metrics rated poor	Poor	>170	>10	>0.40
Fair	All other combinations	Fair	95-170	5-10	>2-4
Good	All three metrics are Good	Good	<95	<5	<0.2



Existing Scoring and Ranking

Each region scores its own project nominations using spreadsheet workbooks provided by Statewide Planning. Regional leadership reviews and adjusts scoring based on individual project factors as well as regional system needs. This is done in part because criteria do not always differentiate between projects. All regionally nominated projects are submitted to Statewide Planning for input into a single spreadsheet and ranking.

There are several challenges to achieving an objective and consistent process for scoring projects:

- There are not standardized methodologies/procedures that all regions follow.
- There is no centralized system for the maintenance and distribution of the data. In addition to the primary data sources, each region may have access to local or regional data they also use for scoring, making it difficult to compare projects across regions.
 - There is no quality control/review of the scoring.



SAFETY

**Alaska
CARE (Crash
Database)**

Includes statewide
crash data.



PAVEMENT CONDITION

**AgileAssets
Pavement
Management
System**

Provides predictive
pavement
condition and
network-wide
optimization
analyses to
prioritize pavement
preservation,
rehabilitation, and
reconstruction
projects.



BRIDGE

**AASHTOWare
Bridge
Management
System**

Provides predictive
bridge condition
including decking,
superstructure,
and substructure
ratings, and overall
bridge status
(Not Deficient,
Functionally
Obsolete,
Structurally
Deficient).



TRAFFIC

**GIS AADT
Data**

Includes the
Annual Average
Daily Traffic
(AADT), number
of lanes, and NHS
description.

- Maintenance Management System: Tracks work orders and costs for maintenance of roadway infrastructure.
- Roads and Highways Geodatabase: This is a content management system for GIS that has the potential to simplify department-wide access to data, maps, applications, and promote the sharing of information.



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Stakeholder Feedback

There is a general lack of communication between regions regarding the data used and the scoring process. Each region indicated that other regions may use different data sources making it difficult to compare projects. Additionally, some felt that data is manipulated to make projects rank higher. Specific feedback includes:

- All projects should be scored based on the problems they are solving. For example:
 - A drainage problem shouldn't get a safety score unless it can be clearly linked.
- For safety, it isn't always clear if the scoring reflects the existing issue. The scoring needs to reflect that the proposed project is solving the contributing factors of the crash history.
- If safety is the number one criterion, high volume urban roadways will always rank highest. Safety must be a consideration, but it must also be put in the proper context.
- If a project is scoring lower than a region would like to see, the project limits are often extended to encompass a bridge, additional failing pavement or a safety issue to increase the score.
- There was a lot of discussion on how "mega" projects should be handled using the Planning and Environmental Linkage (PEL) study process. Some stakeholders expressed that each project identified in the PEL should be a separate project in the STIP. Others stated all projects identified within the PEL should be a single project in the STIP.
- Statewide staff have very little working knowledge of individual projects and because there is no standardized nomination form, levels of project descriptions vary. Therefore, it is difficult to make informed decisions and manage the process for 100+ projects.

STIP Balancing Meeting

A balancing meeting is held after projects from each region are assembled into a scored, prioritized list. The purpose of the meeting is to review and amend the project list for inclusion in the STIP. The prioritized list, including the individual project scores for all categories, is distributed to the CPRT prior to the STIP balancing meeting. CPRT members include:

- The Program Development Director (1)
- The Program Development Operations Manager (1)
- Field office and Statewide planning chiefs (4)
- Regional pre-construction engineers (3)

Scope, Schedule and Estimates (SSEs) are provided for projects that score in top 10 percent of the final project list. Often these SSEs have not been prepared during the nomination, scoring or ranking process. Formatting and level of detail included for each SSE varies by region, level of project development, and project scale.

Stakeholder Feedback

Most stakeholders expressed that project balancing will always be necessary to address any unique circumstances and to verify the program is addressing all state-wide NHS needs.



NATIONAL PERFORMANCE BASED PLANNING NOTEWORTHY PRACTICES

Through a literature review, research was conducted to review successful practices from other agencies related to their STIP processes. More specifically, this research focused on how other state transportation agencies incorporate performance-based planning and programming practices into their project nomination, evaluation, and scoring procedures to prioritize NHPP funded projects. Several states have been identified by the Council of State Governments, Transportation Research Board (TRB) and/or the FHWA as leaders in implementing project prioritization processes to increase transparency and improve accountability that public dollars are being invested wisely. Based on availability of documentation and the maturity of programs, the following states were selected from this initial list for more in-depth review:

- Pennsylvania
- Minnesota
- Virginia
- Arizona
- North Carolina

While all the states reviewed have numerous variables that differ from Alaska such as program size, complexity, governmental structure, funding sources, and interagency relationships, they all demonstrate leadership in certain project management procedures that optimize their transportation investments regardless of funding source (federal or state). Each state employs some processes that may be applicable to Alaska and others that probably are not. This scan spotlights practices that are applicable to the unique characteristics of Alaska's NHS and should be considered for implementation.

The practices most relevant and applicable in Alaska are summarized below, followed by a more in-depth discussion.

1. Integrate performance-based planning and programming throughout all multimodal transportation plans.
2. Develop and align a "family of transportation plans" that directly link statewide goals and planning to project prioritization, and programming. A key component of this is an investment or funding allocation plan that is flexible to agency constraints and has an intentional link to planning and programming, aligning directly with the statewide LRTP and TAMP.
3. Implement a project identification and screening process to identify the full range of project possibilities and screen projects for eligibility and consistency between their purposes and the statewide vision/long-range transportation plan before they move to the scoring process.
4. Use project criteria to score and prioritize the projects using both quantitative and qualitative performance metrics. These metrics are outcome-based and link back to the LRTP and TAMP. Criteria and weighting are re-evaluated on a regular, pre-determined basis, often annually.
5. Develop and dedicate resources to maintain data management systems and evaluation tools to improve decision making and provide accessible and shared data to the public and stakeholders.
6. Develop and regularly update guidance manuals and checklists to standardize the STIP process across the regions.
7. Work collaboratively with the public, MPOs and other planning partners to establish a decision-making process that is transparent and well-documented.



Performance Based Planning and Programming

In response to federal requirements, funding constraints, and the demand for increased transparency from the public, states are shifting to a performance-based planning and programming approach that has itself become an industry best practice. FHWA defines performance-based planning and programming as follows:

Performance-Based Planning is the use of agency goals and objectives and performance trends to drive development of strategies and priorities in the long-range transportation plan and other performance-based plans and processes. The resulting planning documents become the blueprint for how an agency intends to achieve its desired performance outcomes.

Performance-Based Programming establishes clear linkages between investments made and their expected outputs and outcomes. In performance-based programming, the planning strategies included in LRTPs and other performance-based plans translate into project selection criteria. Agencies use the project selection criteria to allocate resources to specific projects and programs with the aim of achieving strategic goals, objectives, and performance targets."

As part of performance-based planning and programming, there is the recognition that over-investment in one location could effectively remove resources from other projects. *Right-Sizing Transportation Investments (National Highway Cooperative Research Program (NCHRP) Project 19-14)* provides guidance and toolkits to support performance-based planning and programming for identifying, evaluating, and communicating multimodal transportation investment right-sizing scenarios. The report defines right-sizing as "a process by which a transportation agency makes intentional decisions to adjust the size, extent, function, and composition of its existing or planned infrastructure and service portfolio in response to changing needs over time."

As an example, North Carolina DOT (NCDOT) has a Strategic Mobility Formula which funds roadway projects with revenue distribution as follows.



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NCDOT's Strategic Mobility Formula funds roadway projects in three categories with revenue distribution as follows:

40% for Statewide Mobility:

Roadway projects in this category include existing and future interstate highways, and NHS Strategic Highway Network routes. The project selection process is based 100% on data. No more than 10% of the funds, over any five-year period, may be assigned to any project or group of projects in the same corridor within a Highway Division or within adjoining Highway Divisions.

30% Regional Impact:

These projects include interstate highways, NHS, Strategic Highway Network, and U.S Highway routes, other state highway routes. Projects compete within regions made up of two NCDOT transportation divisions, with funding divided among the regions based on population. Data make up 70% of the project scores in this category. Local rankings account for the remaining 30%.

30% Division Needs:

This group of projects includes roadways listed under Statewide Mobility and Regional Impact as well as any other state highway routes, federally funded independent bicycle and pedestrian improvements, and federally funded municipal road projects. Funds are equally shared over NCDOT's fourteen transportation divisions. Project scores are based 50% on data and 50% on local input.



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Family of Plans

Long-range plans and investment plans are used to define goals, objectives, and performance and funding targets. Scenario planning is used to analyze and evaluate strategies and different funding and project prioritization alternatives to achieve desired outcomes. Many states use a “family of plans” to set the direction for investment decision-making. Several examples are provided below. All states also have asset management plans that are integrated into the long-range planning, project programming, financial planning, and risk assessment process.

Minnesota

- **Minnesota Go:** Sets a 50-year vision for Minnesota's multimodal transportation system.
- **Statewide Multimodal Transportation Plan:** Establishes overarching objectives, strategies, and performance measures for the transportation system.
- **20-year State Highway Investment Plan (MnSHIP):** Establishes an overall distribution of expected revenue to fulfill the objectives, strategies and performance measures in the Statewide Multimodal Transportation Plan. The plan includes expected outcomes and performance targets the agency uses to inform project selection.
- **10-year Capital Highway Investment Plan:** This plan communicates programmed and planned capital highway projects over the next 10 years. It is updated yearly to remove projects that are under construction, adjust timing of planned projects, and add new projects. The document serves as a check to ensure that the Minnesota Department of Transportation (MnDOT) is meeting the investment levels and performance outcomes identified in the MnSHIP. The first four years of the plan serve as the STIP.
- **Statewide Freight System and Investment Plan:** This plan is used to select projects eligible for NHFP funding. Project proposals are solicited from cities, counties, MnDOT districts and other road authorities for three project categories: safety, congestion/efficiency improvements, and first/last mile connections.

MnDOT defined overall investment categories for funding allocation:

- **Pavement Condition:** Overlays, mill and overlays, full-depth reclamations, and reconstruction
- **Bridge Condition:** Replacement, rehabilitation, and painting
- **Roadside Infrastructure Condition:** Drainage and culverts, traffic signals, signs, lighting, retaining walls, fencing, noise walls, guardrails, overhead structures, rest areas, intelligent transportation systems (ITS), and pavement markings
- **Jurisdictional Transfer:** Continued work with local government partners to agree on and commit to roadway transfers that align the traveler's expectations of the facility with the proper level of investment and lower future maintenance and capital costs
- **Facilities Traveler Safety:** Proactive, lower-cost, high-benefit safety features; sustained crash location treatment; improvements at sustained crash locations; railway and highway crossings



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Arizona

- **“Building a Quality Arizona,” the 2010 Statewide Transportation Planning Framework Study:** Through multimodal visioning, a fiscally-unconstrained vision for the state's transportation system in 2050 was developed.
- **“What Moves You Arizona?” the state's LRTP 2010- 2035:** This plan documents existing conditions and future trends that could influence system performance and investment needs as well as goals, objectives, and performance measures. It assesses future needs and anticipated revenues, considering an array of programmatic investment choices to illustrate likely future system performance under different investment mixes and establishing a preferred investment option based on a realistic revenue forecast (fiscally-constrained).
- **Development Program and Five-Year Transportation Facilities Construction Program:** As part of the process, a “Development Program” was added to represent an additional five years (years six through ten) that will feed the Five-Year Construction Program/Delivery Program. This enables almost all projects to be delivered within the year and quarter for which they are programmed.
- **Projects are selected for funding (programming)** based on their contribution to the improvement of system performance compared to other projects.
- **Once the programming list is complete,** the system is assessed based on the contribution that the program-selected projects will have on the system as a whole.

AZDOT's budget was allocated into three categories through significant system performance analysis, which determined what investment mix would achieve goals.

The investment percentages are intended to establish a starting point for annual discussions. AzDOT and its partners have the flexibility to adjust allocations based on changing circumstances and priorities. This process included significant input from stakeholders and the public.

- 35% for Bridge and Pavement Preservation
- 18% for Modernization
- 47% for Expansion

PennDOT

- **PA On Track Long-Range Transportation Plan and Comprehensive Freight Movement Plan:** This plan sets the vision for 20 years into the future and outlines the transportation investments that are needed to support the goals. It includes alternative investment scenarios.
- **Transportation Program Financial Guidance:** This is developed by a Financial Guidance Workgroup consisting of representatives from MPOs, regional planning organizations (RPOs), FHWA, and the Pennsylvania Department of Transportation (PennDOT). The financial guidance is based on a long-term strategic viewpoint, readily available data, statewide and regional needs-based decision-making, responsiveness to near-term issues and priorities and coordination with other agencies. It establishes revenues, estimated revenue growth rates, and the distribution for federal funds.



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- **Twelve Year Program:** This is a mid-range planning tool used to identify and prioritize transportation projects. It is a multimodal, fiscally-constrained program spanning a 12-year period. The first four years correspond with the federally required STIP and regional TIPs.

Project Identification and Screening

Most states follow a similar project selection process that includes project nomination and some level of initial screening before a project advances to scoring for inclusion in the STIP. Research identified the following applicable practices.

- The project solicitation process collaboratively engages planning partners
- An initial screening process-go/no go decision is made based on feasibility:
 - Does the project meet an identified need in the transportation planning documents?
 - Is it compatible with and does it further goals outlined in planning documents?
 - Can it be implemented from a technical standpoint?
 - Are there obvious environmental impacts that would preclude implementation?
 - Is the project cost within the realm of possibility for current funding, or will special dedicated funding be required?
- Standardized policies and procedures are followed regarding minimum requirements for the level of project information required

Virginia

The State of Virginia's Commonwealth Transportation Board developed an objective and quantitative transportation scoring process. The result was SMART SCALE (**S**ystem **M**anagement and **A**llocation of **R**esources for **T**ransportation: **S**afety, **C**ongestion, **A**ccessibility, **L**and Use, **E**conomic Development and Environment). The SMART SCALE process was designed for project funding transparency and uses quantitative scoring measures, extensive stakeholder education and outreach, and public posting of all project scores and rankings. Projects are pre-screened using an application process to ensure they meet an identified need in VDOTs' LRTP and eligibility requirements. There is a limit on the number of pre-applications and applications allowed per applicant, based on population thresholds. As part of the application process, "project readiness" documentation is required.



Criteria and Weighting

Evaluation criteria, weighting and scoring are highly customized to each state based on its program priorities. Data availability and reliability play a role in which criteria are used. Projects are typically prioritized using outcome-based quantitative and qualitative performance metrics that link back to the state's LRTP and TAMP. Projects are ranked in a variety of ways, such as statewide, by district, by type, or by mode. For criteria that are hard to quantify, general units such as significant, moderate, or minimal impact are used. In addition to the score and rank, a brief narrative is included describing which goals, targets, policies, and priorities the project links to. Example criteria from surveyed states are summarized on the following pages.

Criteria	Example Metrics
Preservation Project Evaluation Criteria	
Pavement Condition	<ul style="list-style-type: none">• Pavement ride quality• Pavement structural integrity• Timing of improvements• Traffic volume• Truck volume• Length/miles covered• Other infrastructure needs (culverts, drainage pipes)• Corridor significance
Bridge Condition	<ul style="list-style-type: none">• NBI sufficiency rating• Composite health factors (superstructure, substructure, deck, culvert condition)• Scour criticality• Fracture criticality• Bridge size• Truck volumes (% of ADT)• Traffic volumes• Risk of service interruption• Detour length (out of service bridge)• Corridor significance• Remaining service life
Other Project Evaluation Criteria	
Safety	<ul style="list-style-type: none">• Fatal and serious injury crash history and prediction• Part of a Vision Zero program• Benefits to environmental justice populations• Cost-benefit ratio• Emergency evacuation
Modernization	<ul style="list-style-type: none">• Delay reduction (travel time savings)• Traffic flow improvement (future traffic volume)• Expected crash reduction



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Criteria	Example Metrics
	<ul style="list-style-type: none"> • Freight flow improvement (truck volumes) • Corridor significance • Supports statewide plans • Multimodal enhancements • Person throughput • Return on investment
Accessibility	<ul style="list-style-type: none"> • Access to jobs • Access to jobs for disadvantaged communities • Access to multimodal choices • Economic distress indicators • Travel time savings per user Remaining service life
Economic Development	<ul style="list-style-type: none"> • Promotes general economic development locally and regionally • Enhances or improves tourism • Enhances movement of freight and services • Improves or enhances the movement of workers • Improves access to jobs and opportunities • Development potential • Rural area of critical economic concern • Tons of goods impacted • Improvement in travel time reliability
Land Use/Transportation Plan Coordination	<ul style="list-style-type: none"> • Complies with LRTP • Complies with TAMP • Complies with local adopted land use plans • Future transportation and efficient land use factor (population/employment density)
Freight	<ul style="list-style-type: none"> • Travel time reliability • Crash rate • Sustained crash location • Truck volume • Truck percentage • Bottleneck delays • Future interstate completion factor (project length divided by miles to complete corridor between NHS routes)
Environmental Justice	<ul style="list-style-type: none"> • Increase access to multimodal travel choice • Risk of service interruption
Resiliency	<ul style="list-style-type: none"> • Includes strategies that reduce greenhouse gas emissions, vehicle miles traveled, energy use • Completed plans such as vulnerability assessment, risk assessment and/or adaption strategies which serve as a basis for scoring.



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Weighting factors are often used to help balance the needs of rural projects against urban ones. For example, even if an urban project has more beneficial impact than a rural project in an underserved area, a pre-established equity weighting factor may cause the rural project to be prioritized over the urban one. Weighting factors are often updated annually by committee and tested over several projects. Examples of how project weighting is utilized by several best practices are included below.

- Virginia Department of Transportation (VDOT) weights their scoring criteria with extensive input from the region where the project is located. Criteria weighting varies by pre-assigned categories that follow planning district commission and MPO boundaries. For example, areas assigned as category A are more densely urbanized and weighting for congestion mitigation is higher. In less developed areas, such as categories C and D, the project's economic development and safety characteristics are rated higher.
- NCDOT weights local input at 30% and technical performance at 70% for regional projects but weights local input at 50% and technical performance at 50% for district projects.
- AzDOT calibrates evaluation criteria weights annually to achieve performance targets for the following conditions: pavement, bridge, safety, mobility, and air quality.

Data and Scoring Tools

Data

Data is vital to how DOTs plan, invest in, and evaluate transportation networks in response to increasing regulations, funding constraints, and rising demands for transparency in the decision-making process. There is also rapid growth of connected devices which provide geospatial movement data at a scale never seen before, even in more rural parts of Alaska. Smartphones, vehicle telematics, fitness trackers, credit card transactions, and online map searches offer detailed data points about people's transportation demands (Brookings Institute, July 2017). Transportation agencies already manage many of their physical assets: roads, bridges, signs, lights, etc. Data is no different and must be treated like other physical assets. Based on other state's experiences and interviews with DOT&PF stakeholders, key challenges to the on-going development and maintenance of a data governance system include:

- The magnitude of effort needed to address the following:
 - Fragmented data management systems housed within different departments/divisions
 - Lack of centralized "ownership" and maintenance of data, resulting in redundancies and inconsistencies in standards
 - Outdated or unsupported software
- Defining a process to validate, prioritize, or address identified business problems whose root causes could be attributed to data quality and governance challenges
- Defining data purpose and intended uses
- Getting previously siloed divisions/business units to work collaboratively toward organization-wide data governance, instead of business area, or system specific, governance



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- Shifting the culture to educate division/business units that data governance is not IT-led
- Overcoming the tendency for operational priorities to take precedence over longer-term strategic initiatives like data governance. This risk must be mitigated via an internal communications plan and by demonstrating value to business areas
- Addressing the need for potential reorganization and new expertise and positions.

Successful data governance plans are resource-intensive (financial, human resources and technology) and must also have strong leadership and support from division/business users. They must be set up as a repeatable, core business practice rather than a standalone “once and done” project. The basic framework of any data governance plan is to establish standardized principles, policies, standards, controls, and procedures. Each item/activity should be clearly scoped with defined outcomes, metrics where possible, timeline for completion, and level of effort from key participants. Samples might include:

- Number of people in governance structure that were trained
- Number of business plan points addressed
- Hours of effort saved or dollars saved / costs avoided, etc.

NCHRP Synthesis 508: Data Management and Governance Practices and *NCHRP 08-115 Guidebook for Data and Information Systems for Transportation Asset Management* are two resources for best practices on establishing organizational strategies and governance mechanisms. They provide practical examples for improving processes for data collection and sharing that information for decision-making to manage transportation system assets. Moving forward, data management planning and systems should be nimble enough to handle traditional data and plan for emerging data sets. A successful data governance system will result in:

- More accurate reporting and analytics
- Improved decision-making
- Improved cross-functional reporting
- Increased long-term operational efficiencies and cost savings
- Greater potential for innovation, use of predictive analytics, and incorporating big data
- Open, accessible, usable, and shared data to improve public and stakeholder trust

Evaluation Tools

Of the states reviewed, many use Decision Lens or have developed a specific in-house tool for scoring projects. States report that regardless of the tool used, it takes significant resources, stakeholder input and continual re-evaluation for successful implementation of their programs.

A customized GIS-based tool should be considered to build on the existing DOT&PF Roads and Highways Geodatabase. The GIS application can be designed to analyze multiple layers and attributes to help identify project opportunities along the NHS. The tool can generate a range of performance scores and ranking and graphically display rankings on a map and in tabular form. The existing NHS centerline, a linear referenced system containing postmile measures, would serve as the backbone for analyzing and storing the attributes driving a performance score.



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State/ Agency	Process/ Tool Name	Tool Description
VDOT	SMART SCALE	<p>SMART SCALE is a web-based GIS tool that also uses Sugar Access, an ArcGIS extension from Esri partner Citilabs that helps communities analyze, manage, and visualize their transportation networks. Sugar Access is an extension to ArcGIS Desktop that allows convenient scenario creation and evaluates accessibility by calculating how long it takes to walk, bike, or drive to and from public transportation stations; how reliable public transit is; and wait and transfer times. Applications are submitted through a web-based portal, which captures all the required application information and includes a web-based mapping tool to show the project's geographic extent. SMARTSCALE assigns normalized measure values and applies predetermined weights to produce a project benefit score. The score is then divided by the SMART SCALE-funded cost of the projects to determine the value of benefit for every dollar invested. The projects are then prioritized and form the Six Year Improvement Program (the equivalent of the STIP). All project scores and funding recommendations are available publicly on the SMART SCALE website, and SMART SCALE project implementation is tracked via a regularly updated dashboard on the same website. The Smart Portal is also used for applications for other state grant programs so that information from one grant application is easily copied to another. VDOT hosted workshops on the process to obtain feedback and as a result, the process shifted to biennial updates to allow applicants more time to develop the analysis needed for SMARTSCALE.</p>
NCDOT	SPOT Online	<p>Projects are submitted through SPOT Online, a GIS-based tool, to the Strategic Prioritization Office of Transportation (SPOT) office. The online tool captures project characteristics needed for scoring and then takes the data to generate GIS data. Some of the scoring is straightforward; for example, travel time savings is calculated for each project individually using a script that runs the project data from the SPOT Online tool through a script in the statewide travel demand model. Other scoring, such as project benefits (e.g., intersection improvements), are more labor intensive. Safety scores for each project are individually calculated by an NCDOT safety engineer. A planning level cost estimate is generated for all projects through the SPOT Online Cost Estimation tool. During the scoring process, all scores are reviewed by NCDOT Divisions and MPOs prior to publication. Staff rely on a team of contractors, as well as NCDOT staff, to assist in the scoring process. The process began in 2009 and NCDOT continues to engage with stakeholders to incrementally refine the and enhance the process. A Working Group met a total of 18 times between October 2016 and May 2017 to develop recommendations for the P5.0 schedule and process, including highway and non-highway scoring measures and changes in the use of local input points and the normalization process.</p>
Arizona, Pennsylvania and over twenty other transportation agencies (per Decision Lens)	Decision Lens	<p>Decision Lens was developed to link transportation planning and programming to performance-based resource allocation in support of the FAST Act.</p> <p>It is a cloud-based solution with advanced visualizations that:</p> <ul style="list-style-type: none"> • Uses both objective performance data and more subjective assessments of project importance. Available criteria are built into the system,



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State/ Agency	Process/ Tool Name	Tool Description
Arizona, Pennsylvania, and over twenty other transportation agencies (per Decision Lens)	Decision Lens	<p>however, Decision Lens report that most states develop customized criteria.</p> <ul style="list-style-type: none">• Allows stakeholders to weight criteria.• Generates an interactive, prioritized list of projects and investments and users can assess the impact of varying weights on the ranked project list.• Can compare multiple scenarios and analyze the changes to achieve different objectives and the relative trade-offs in system performance. <p>Many of the features are add-ons to the base program and additional customization of the program will be necessary to meet DOT&PF's need.</p> <p>In 2010, PennDOT began using Decision Lens and made it available to all its regional planning partners. This allowed each planning partner to input projects by funding area and select and weight quantitative and qualitative criteria and see the impacts on project priorities. Through this process, they could see what a set of policy choices would look like in practice, and to use the results to make resource allocation decisions as they programmed projects in their TIPS, which are integrated into the STIP.</p>
Oregon (ODOT)	Mosaic	<p>Oregon's Mosaic tool is designed to be used during a major transportation planning process such as a larger city or region's system plan or major corridor plan and is built around the goals and policies of the Oregon Transportation Plan. It is a planning level analysis tool that provides planners and decision makers with an effective and efficient way to evaluate the social, environmental, and economic costs and benefits of transportation actions and investments. It represents possible impacts of transportation investment decisions at a system level and is not intended to evaluate individual projects or for project prioritization. Mosaic uses "indicators" of transportation system performance (access, equity, mobility, quality of life, safety, environmental quality, and economic vitality) that gauge the direction and degree of impact for different investment bundles relative to one another. The tool itself is an Excel workbook and according to ODOT, it is detailed, complex and data intensive. Key benefits are a consistent, documented and transparent process for decision making at the planning phase.</p>

Guidance and Procedural Documents

Each state has guidance and procedural documents that are regularly updated to define a standardized process that is defensible, reproducible and transparent. Processes to review and change aspects of the prioritization process are done collaborative fashion with planning partners that facilitates continued buy-in from all stakeholders.

For example:

- **Arizona:** "Linking the Long-Range Plan and Construction Program," or Plan to Program (P2P) Link is a plan that connects the goals of the LRTP to the Five-Year Construction Program. It details



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how to migrate from current departmental practices to a performance-based planning, programming and financial decision-making process to optimize transportation system performance. It includes process methodologies for project selection, criteria and evaluation.

- **Pennsylvania:** PennDOT has the Transportation Program General and Procedural Guidance that outlines a performance-based planning approach, identifies opportunities for collaboration, defines requirements for the documentation of the STIP development process, roles and responsibilities, and describes the procedures for the project selection and prioritization process.
- **Minnesota:** MnDOT has a Guide to Project Selection and Project Selection Policy. The Guide to Project Selection addresses the evaluation and prioritization of capital construction projects and discusses the decision to add a project to either the 10-year Capital Highway Investment Plan or the STIP. The Project Selection Policy focuses more on the data, criteria and methodology for scoring projects.

Included in the guidance documents are procedures for updating the STIP and rescoring projects.

- MnDOT annually reviews and revises the criteria and methodology for each project selection process to incorporate new research and guidance, changes in state or federal law, updates to state plans or policies, stakeholder feedback, and lessons learned from implementing the new project selection policy. Scoping decisions for capacity projects do not typically need rescoring, but the following thresholds require an updated score:
 - Cost of capacity expansion element(s) increases by more than 20%
 - Scope changes would likely meaningfully change the benefit-cost ratio (i.e., change in travel time savings or safety benefits great enough to affect the benefit-cost ratio rounded to the nearest whole number)
 - The nature of the project changes
- For the NCDOT STIP, both new projects and existing projects subject to reprioritization are scored and considered for funding in the next STIP cycle. In general, projects programmed for right-of-way or construction in the first six years of the STIP and are not subject to reevaluation. Existing projects are subject to a review if they are "vastly different" from when they were scored based on the thresholds below. If they meet any of the thresholds, they are subject to a more in-depth review and may require reprioritization:
 - **Cost:** Increases of more than 35% or \$25 million
 - **Scope:** If the project is down-scoped such that it decreases the overall benefits by more than 50% or if the project was approved as a future primary route but is no longer being designed to meet those standards
 - **Financial Arrangement:** the local contribution decreases by any amount

The following section provides three example workflows and timelines for developing a STIP. Each of the states referenced has a transportation board or commission that provides a statewide perspective in the process and decision-making, as described below.

PennDOT State Transportation Commission (STC): The STC was established by PA State Law, Act 120 of 1970. The STC is a 15-member body, chaired by the Secretary of PennDOT. It consists of 10 appointed citizens and the majority and minority chairs of the state House and Senate



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Transportation committees. The STC determines and evaluates the condition and performance of Pennsylvania's transportation system to assess the resources required to preserve, restore, extend and expand transportation facilities and services. The STC also is focused on the conservation of Pennsylvania's communities and economic development.

Penn DOT Transportation Advisory Committee. The Transportation Advisory Committee was also established by Pennsylvania State Law, Act 120 of 1970. The Committee consults with and advises the STC and the Secretary of Transportation on behalf of all transportation modes in the Commonwealth to determine goals and allocate resources for planning, developing and maintaining programs and technologies for transportation systems. The Committee consists of 30 members (19 from the public).

Arizona State Transportation Board (Board). Arizona State law (A.R.S. §28-304/305) outlines the responsibility of the Board. Each of Arizona's transportation districts is represented. No outside agency or public members serve on the board. The Board is responsible for establishing a complete system of state highway routes in Arizona, is granted policy powers by the Governor and serves in an advisory capacity to the Director of the AzDOT. The Board is responsible for development and oversight of the State's Five-Year Transportation Facilities Construction Program and for policy and rulemaking. The Board awards construction contracts, monitors the status of construction projects and has the exclusive authority to issue revenue bonds for transportation financing.

Virginia Commonwealth Transportation Board (CTB). The CTB consists of 17 members. One member is chosen from each of the state's nine highway districts and five members are selected as at-large members. The CTB is a policy board that oversees transportation projects and initiatives for the Commonwealth of Virginia and has direct authority to approve the policies and objectives of VDOT. The CTB allocates funds to interstate, primary, secondary, and urban highway systems for the Six-Year Improvement Program/STIP.



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PennDOT – Twelve Year Program/STIP Process Updated Every Two Years			AzDOT STIP Process Updated Annually	VDOT STIP Process Updated Annually
February	Release Transportation Performance Report		Perform system assessment	Submission of basic information
March	State Transportation Commission (STC) Financial & Procedural Guidance work group meetings	Public outreach to identify needs		Pre-screening & eligibility
April				
May				
June		<ul style="list-style-type: none">Interstate Steering Committee rides of NHS for State of Good Repair projectsEJ Regional Population Profiles available to MPOsPublic outreach feedback provided to STC, MPOs and PennDOT		
July	<ul style="list-style-type: none">Interstate carry over projects releasedAsset management candidate projects releasedInterstate Steering Committee presentationsDraft Financial & Procedural Guidance released		Review system assessment	Application refinement
August	Final Financial and Procedural Guidance released			Application submission
September	<ul style="list-style-type: none">EJ conditions data (pavement, bridge, safety and transit) available to MPOsDraft Interstate and Statewide projects announcedTIP/TYP Collaboration	<ul style="list-style-type: none">Districts, MPOs and Central Office meet to coordinate on carryover & candidate projectsProject updates made in Multimodal Project Management System (MPMS).Statewide STIP Memorandum of Understanding development/finalization	Project nominations	Measures development & scoring
October	<ul style="list-style-type: none">Fall planning partners meetingMPOs training on EJ core elementsTIP/TYP CollaborationEJ Core Elements burdens and benefits analysis conducted by MPOs			



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PennDOT – Twelve Year Program/STIP Process Updated Every Two Years			AzDOT STIP Process Updated Annually	VDOT STIP Process Updated Annually
November	<ul style="list-style-type: none">MPO submit Draft TYP/TIPs to Districts, Program Center and FHWA/FTA for reviewFinal Program Distributed	<ul style="list-style-type: none">TIP/TYP collaborationProject updated in MPMSStatewide STIP MOU development/finalizationEJ Core Elements burdens and benefits analysis is conducted by MPOs/RPOs	Project Ranking	
December			Risk Based Scenarios and project selection for 10 year program	
January	Release evaluation of projects and recommended funding scenario			
February	<ul style="list-style-type: none">CBT considers evaluated projects for inclusion in Six Year Improvement programHold public hearing on Draft			
March				
April				
May	MPOs and PennDOT conduct air quality conformity analysis	STIP/TIP Public Comment Period		
June	MPOs adopt regional TIPs		State Transportation Board Approval	CTB adopts Six Year Improvement Program
July		<ul style="list-style-type: none">MPOs submit TIPs to PennDot for review		July – December – Lessons learned from prior rounds
August	STC approves TYP PennDOT submits STIP to FHWA/FTA on behalf of Governor	FHWA/FTA reviews and approves air quality conformity documents and STIP		
September				
October	Program Begins			



Stakeholder Engagement & Equity

A key element of successful performance based planning is meaningful stakeholder collaboration. All levels of plans are developed through dialogue with planning partners, including MPOs and the public. This approach helps establish credibility with members of the public, who often have the perception that project decisions are based more upon political motives than needs.

PennDOT received national recognition from the American Association of State Highway and Transportation Officials (AASHTO) and TRB for effectiveness, innovation, participant diversity, and quality feedback. In addition to the tools below, their website has multiple educational tools to walk the public through the program:

- A customized, interactive online survey that invited participants to:
 - Identify their preferred mode of transportation and frequency of use
 - Rank their transportation system priorities
 - Develop their version of a multimodal transportation budget
 - Map their transportation concerns throughout the state
 - Voluntarily provide demographic information
- An online public meeting
 - Aired live with an interactive audience of public participants
 - Integrated with social media to expand public interaction opportunity
 - Recorded and posted on the STC website for public access post-event
- A standardized project feedback form

Many states have also passed legislation, which also helps establish credibility with the public. To increase transparency, improve accountability, and build public trust in how transportation dollars are invested, some states have legislated funding allocation requirements, while others have focused more on goals and standardized processes. States that have funding formulas based on legislative mandates have limited flexibility to respond to transportation needs and struggle to implement performance-based programming.

North Carolina's Strategic Mobility Formula provides the framework for allocating funding across geographies as well as the scoring criteria for each mode. This formula dictates the criteria but it does not dictate the scoring measures or weighting. Local input is incorporated into the process but the law requires projects be funded based on the scores and cannot be altered by a political body. The NCDOT has made organizational changes to improve and sustain the performance and condition of its assets. It has aligned and assigned ownership, roles, responsibilities and accountability for performance of the system across business units, eliminating silos and forcing collaboration. Accountability



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is clear and transparent, starting at the highest level. These approaches have been integrated into the agency's day-to-day operations and are expected to continue irrespective of changes to the leadership.

Minnesota legislative direction requires each selection process to:

- *Identify criteria, the weight of each criterion, and a process to score each project based on the weighted criteria*
- *Identify projects that were selected as well as those that were not selected*
- *Publicize the final evaluation score for each project as well as the reason(s) that were relied upon for all projects that were not selected*

SMART SCALE measures were developed and continue to be revised with extensive stakeholder outreach to staff, districts, agencies, contractors, consultants, and others involved in its implementation. During the application period, VDOT conducts extensive outreach with applicants to support the development of project applications. In each SMART SCALE cycle, the CTB and the public review the screening, scoring, and ranking results. All project scores and funding recommendations are available publicly on the SMART SCALE website, and SMART SCALE project implementation is tracked via a regularly updated dashboard on the same website.

DOT&PF PROJECT SCORING & RANKING RECOMMENDATIONS

Under the performance-based planning model, project scoring using defined criteria is one step in an overall ranking process to guide resource allocation to the right projects. Noteworthy practices from other states that promote a balanced project criteria and ranking process include:

- Categorizing projects by investment category or type of project, so like projects compete against one another. Typical categories for roadways include preservation, expansion, and modernization.
- Defining qualitative and quantitative criteria to score and rank projects. Criteria are based on planning strategies from long-range transportation and asset management planning documents. Data availability and reliability play a role in which criteria are used.



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- Applying weighting factors to the evaluation criteria to account for priorities and geographic distribution. Each state thoroughly customizes its evaluation criteria and weighting based on program priorities and input from stakeholders. Weighting factors are typically updated annually.

It is recommended that the DOT&PF ultimately implement a comprehensive performance-based planning approach for STIP development which includes:

- Categorizing NHS projects by type prior to scoring and ranking
- Updating project ranking criteria

The Proposed Project Categories/Types

Project categories were developed based on a review of best practices from other states, the Alaska LRTP, and TAMP. Setting project categories activates the following advantages:

1. Sets a strategic direction for statewide priorities, unifying DOT&PF's vision with more focus on performance and data for projects of all sizes
2. Bundles projects in a logical manner so comparable projects compete with one another
3. Allows specific criteria to be established for each category, making it simpler to differentiate between projects and consider geographic distribution. This aids compliance with environmental justice directives and laws
4. Facilitates reporting of outcomes, specifically federal performance measures/targets required by the FAST Act and identified in the TAMP
5. Fosters more accurate projections to inform funding needs forecasts
6. Increases transparency and accountability to stakeholders and the public

The biggest challenge with establishing project categories is deciding how to allocate funding. Most states accomplish this through scenario planning. Under performance-based planning, funding allocation is intentionally linked to planning and programming and aligns directly with the statewide LRTP and TAMP. States typically provide clear examples of eligible work types for each category. They either identify a threshold metric to determine when a project moves from one category to another or leave that decision to the project proponent.

Based on an in-person meeting (March 2020, Anchorage, AK), with the TAC, CPRT and other DOT&PF stakeholders, the group collectively agreed on the following project categories for future STIP projects. It is expected that DOT&PF will refine the project type definitions through a collaborative process with MPOs based on statewide transportation goals.



State of Good Repair / Asset Management & Preservation

These projects are required to directly relate back to Federal performance measures/targets and the TAMP to manage assets and reduce life cycle costs.

NHS Pavement Projects

Resurfacing, restoration, rehabilitation, and reconstruction which will not alter the functional traffic capacity or capability of the facility being improved. Typical improvements include projects that maximize or extend an asset's life, such as:

- Mill and overlays— Removing and replacing more than 2 inches of existing pavement and laying new pavement on top
- Section Reconstruction—Completely rebuilding the roadway section at the end of the pavement's service life.

NHS Bridge Projects

Typical bridge improvements include replacement, rehabilitation, and painting. Examples include:

- Emergency repairs related to inspections
- Preservation/minor rehabilitation, such as deck overlays or deck joint replacements
- Rehabilitation/replacement—Reconstructing or replacing structurally deficient bridges to serve the same function with the same characteristics, such as size and number of lanes.

NHS Roadside Infrastructure

- Roadside infrastructure improvements are often completed in tandem with a pavement or bridge project. They can also be stand-alone projects, such as a culvert replacement. For tracking and maintenance purposes, the proposed criteria separate culverts, retaining walls, and slopes into a Roadside Infrastructure category, and signs, lighting and signal equipment into an Ancillary Roadside Asset category.

NHS Modernization

These are projects that go beyond state of good repair and substantially modernize existing assets. They upgrade efficiency, functionality, and safety without adding capacity. Typically, they bring roadways or intersections up to or beyond design standards for efficient operation, safety, and reliability. The intent of this category is to first ask of a project: is this facility built to current Alaska design standards? Only projects **not built to current design standards** would be eligible for consideration within this category.

Example projects include:

- Adding or widening shoulders
- Adding or enhancing pedestrian and bicycle facilities



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- Straightening curves
- Improving traffic control and management
- Reconfiguring intersections and interchanges

These projects may also apply developing technologies or pilot emerging practices.

NHS Capacity Expansion

Projects in this category add capacity and improve traffic flow, congestion relief, travel time reliability, and freight movement. Example projects include:

- Adding new through and/or turn lanes
- Constructing or reconstructing a bridge to add through lanes
- Adding new routes (usually limited by a mileage threshold—if the project is above the set length threshold, it moves to the Major Capacity Expansion category)
- Adding new intersections
- Enhancing intersection capacity

NHS Major Capacity Expansion

This category includes projects that require significant capital, resources, planning, and engineering. Projects focus on improving mobility, safety, and multimodal or freight movements, such as improved or new interchanges. The FHWA defines major projects as "...projects requiring Federal assistance that are over \$500 million in cost, [in which] the processes and Federal requirements involved in project delivery become more complex, rendering it more challenging, but ever more important, for the process to be well-managed." DOT&PF should establish an appropriate threshold for considering projects within the Major Capacity Expansion category for Alaska. Example projects include:

- Grade-separation of existing at-grade intersections
- New alignment
- Adding lane(s) to urban and rural major arterials

Scoring and Ranking Evaluation Criteria

The criteria proposed in the summary tables that follow were developed by considering these factors:

- The FAST Act's emphasis on establishing performance metrics and targets to maintain the NHS, and the expectation that new transportation bills will maintain these requirements as part of funding eligibility
- The Alaska TAMP, which has the goal of using "predictive models to tell the future." This will transition asset management from a "worst first" approach to a proactive one to preserve assets in a state of acceptable condition



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- The most common criteria employed by noteworthy states using performance-based planning and adapted to Alaska's unique circumstances
- Criteria that are predictive in nature and measure outcomes
- Environmental justice (Title VI of the Civil Rights Act, DOT&PF Americans with Disabilities Act (ADA) transition plan): ensuring no minority or low-income population "suffers a disproportionately high and adverse human health or environmental effect" due to "programs, policies, and activities undertaken by an agency receiving Federal funds."
- Stated goals by Statewide Planning, the Technical Advisory Committee, and stakeholders to improve differentiation between projects, equitable geographical distribution, and a more quantitative, data-driven decision-making process.
- Existing DOT&PF evaluation criteria, data availability and established data systems

Illustrative criteria weighting factors are provided; however, determination of the weighting factors is highly dependent on statewide priorities and scenario planning efforts and will require extensive collaboration and regular re-evaluation.

- *It is recognized that implementing a new suite of criteria is a significant effort. Some of the proposed criteria will have data that is immediately available and others will require assembling data sources new to DOT&PF. Scoring tools will also need to be updated to reflect the new criteria.*
- *It is recommended that DOT&PF take a transitional approach to the adoption of revised criteria. This approach is consistent with best practice states which continue to evolve their criteria to meet changing articulated state priorities and funding constraints.*

To this end, there is some redundancy in criteria under each project category so that DOT&PF has the flexibility for a phased implementation in response to the evolution of data, scoring tools and statewide priorities. Additionally, some of the criteria such as consistency with adopted land use and transportation plans could be moved to the project nomination pre-screening process or combined to generate a single score.

DOT&PF must identify the most important metrics that best reflect the highest department priorities to select final criteria for project prioritization.

Table 1. State of Good Repair/Asset Management & Preservation
 Related to Federal reporting requirements and TAMP goals (Pavement Restoration, Rehabilitation, Reconstruction; Bridge Repair, Replacement; Roadside Infrastructure). These projects are prioritized using performance and asset management-based tools.









Criteria For Consideration	Metric	Example Scoring	Proposed Data Source	Example Weighting	Opportunities	Challenges	Other Comments
PAVEMENT							
Predictive Pavement Condition	Pavement roughness index: interstate and non-interstate, Rut and Cracking	Pavement management system (PMS) prioritized list by 'benefit' score – Funding may be allocated by treatment category (Preservation, Rehabilitation, Reconstruction), or investment scenarios may be developed within PMS.			Allocation, scoring and prioritization are based on statewide system as a whole, not by region, to meet TAMP targets. A yearly assessment needs to be completed to verify TAMP targets are being met. In the future, data could be shared with Transportation Geographic Information Section (TGIS) and benefit score by project could be included in the Roads and Highways Geodatabase	Development and refinement of the Agile Assets program is on-going and it will be likely one or two years before the system is fully reliable. As an interim step, it may be necessary to score on predictive cracking, rutting and IRI separately. Input on appropriateness of selected treatment from regional and maintenance staff will be needed to validate PMS prioritized list	The Pavement Management System decision trees are built around pavement condition, regardless of classification or NHS status (interstate versus non-interstate). A future enhancement may be to structure decision trees around functional classification, including NHS status, or adding a modification factor to the calculated 'benefit' based on classification attributes Future funding may be allocated by treatment category (Preservation, Rehabilitation, Reconstruction), or investment scenarios may be developed within the pavement management system.
Maintenance Input	Historical maintenance cost	> \$X over past X years = full points > \$X over past X years = partial points < \$X over past X years = no points	Maintenance Management System (MMS)		Use of MMS data to understand recurring costs to help inform prioritized list within the PMS. Consider cost per mile to normalize scoring	MMS data is being added into PMS but the MMS system will not be online until end of 2020, inconsistencies observed in legacy data currently being used	
BRIDGES							
Predictive Bridge Condition	Structural, life cycle analysis, risk (scour/seismic), performance targets, mobility	AASHTOWARE prioritized list based on cost/benefit score			In the future data could be shared with TGIS group and bridge location and prioritization score could be spatially shown to online GIS mapping with attributes	Pavement and bridge data are on separate management systems	Weighting uses AADT and NHS vs non-NHS as scaling factors, but it doesn't have much impact on scoring
Maintenance Input	Historical maintenance cost	> \$X over past X years = full points > \$X over past X years = partial points < \$X over past X years = no points	MMS		Use of MMS data to understand recurring costs to help inform prioritized list within AASHTOWARE	MMS data and AASHTOWARE are not currently synched	
Detour Length	Length of detour, should structure become impassable	> X miles or no detour = full points X to X miles= partial points X to X miles = partial points < X miles = no points	Roads and Highways Geodatabase		The longer the detour length, the higher the score. Addresses risk management, resiliency and access for disadvantaged communities	–	Also considered as a weighting factor within AASHTOWARE, however, detour length is used more as a scaling factor and the max is ~200km, as a result 80% of bridges exceed this. Recommend detour length is also an independent criterion
ROADSIDE INFRASTRUCTURE							
Roadside Infrastructure Condition (Culverts, Retaining Walls, Slopes)	Life cycle analysis	High benefit = full points Moderate = half points Low = no points	TBD		Additional way to track and maintain DOT&PF infrastructure condition. Infrastructure locations could be sorted as a GIS data layer	No statewide inventory currently exists that is regularly updated. May require additional software contract and data collection	Geotechnical asset inventory and sign inventory known efforts, but information is not centralized and update frequency varies by region
	State of repair	Poor = full points Moderate = half points Good = no points					
Ancillary Roadside Asset Condition (Signs, Lighting, Signals)	State of repair	Poor = full points Moderate = half points Good = no points	TBD				

Table 2. Modernization

(intended for facilities not built to current design standards – add or widen shoulders, add or enhance pedestrian and bicycle facilities, straighten curves, traffic control and management)























Criteria For Consideration	Metric	Example Scoring	Proposed Data Source	Example Weighting	Opportunities	Challenges	Other Comments
Prioritized as State of Good Repair Project	Addresses a prioritized asset management need	Within top X of list = full points Between X and X = half points Below X = partial points Not on list = no points	PMS and/or AASHTOWARE prioritized project lists		Projects that solve multiple problems score higher	PMS and AASHTOWare are not yet at full capacity	-
Land Use and Transportation Plan Consistency	Level of consistency with DOT&PF statewide and regional plans	Consistent = full points Partially consistent = half points Not consistent = no points	DOT&PF statewide plans, regional plans		Linking the 'family of plans,' starting with the 2020/2021 LRTP update	Regional plan update frequency varies	When a screening process is implemented, this criterion could be deleted. Projects that are not consistent with DOT&PF statewide plans should not advance into the STIP based on performance-based planning processes
	Level of consistency with external local plans (borough, tribal and/or municipal)	Consistent = full points Partially consistent = half points Not consistent = no points	Municipal, borough, tribal plans		Facilitate alignment of plans for NHS roadways with local jurisdictions	Not all areas of the state have local governments or planning documents, and for those that do, plans across jurisdictions are not always in alignment. Need to devise scoring for 'no documents' or this criterion could penalize rural areas	Recommend DOT&PF prioritizes a list of plans in coordination with MPOs, boroughs and tribes based on importance (i.e. Tier 1 – X Points, Tier 2 – X points, etc.)
Corridor Significance	Designated safety corridor	Ranked in top 3 = full points Ranked 3 to 6 = half points Ranked 7 or greater = partial points In MPO or Vision Zero Plan as safety concern = partial points	Highway Safety Plan, state designation, Vision Zero or MPO planning document		Addition of safety corridor layer to Roads and Highways Geodatabase	Does not consider expected benefits of project	-
	Strategically significant for connectivity to communities or resources	Only road = full points 1 additional road = partial points >2 roads = no points	Roads and Highways Geodatabase		-	Will need to define 'strategically significant'	Some roadways are strategically significant for the connections they provide between points or areas of statewide significance, and not just because they are designated as safety or freight corridors
	Designated critical freight corridor	Primary = full points Intermodal connector = partial points Critical urban = partial points Critical rural = partial points	Statewide Freight Plan, AMATS or FAST Planning Freight Plans		Addition of freight corridor layer to Roads and Highways Geodatabase	Much of the NHS is designated as a freight route.	Develop point system for type of freight route. For example, primary freight system; intermodal connector, critical urban freight corridor, critical rural freight corridor
Mobility	Future level of service (LOS) – segment or intersection	LOS E = full points LOS C, D = half points LOS A, B = no points	Planning-level future LOS based on service volume tables		Staff training for publicly available resources; potential future research project to customize thresholds for Alaska	Consistency of staff familiarity with planning-level LOS analysis	Generalized planning to determine a need for additional improvements. Example FDOT (Florida Department of Transportation) planning level LOS threshold tables are attached

Table 2. Modernization

(intended for facilities not built to current design standards – add or widen shoulders, add or enhance pedestrian and bicycle facilities, straighten curves, traffic control and management)

Criteria For Consideration	Metric	Example Scoring	Proposed Data Source	Example Weighting	Opportunities	Challenges	Other Comments
Mobility	Identified freight bottleneck	Yes = full points No = no points	Statewide Freight Plan, AMATS or FAST Planning Freight Plans		Addition of freight bottleneck layer to Roads and Highways Geodatabase	-	-
	Daily usage (AADT)	>X (rural), >Y (urban) = full points X to X (rural), Y to Y (urban) = half points <X (rural), <Y (urban) = no points	Most recent year AADT - C2-Cloud, Roads and Highways Geodatabase		-	Will have to define rural and urban thresholds	Minnesota uses different AADT thresholds for scoring urban and rural projects
	Freight volume as percentage of AADT (CAADT)	>X% CAADT = full points X -X% CAADT = half points <X% CAADT = no points			Potential economic benefit measurement	CAADT is not currently a layer built into the Roads and Highways Geodatabase	-
Safety	Expected crash reduction (crash modification factors, crash reduction factor)	> X crash reduction = full points X to X crash reduction = half points <X crash reduction = no points	Alaska CARE, HSIP, Crash Modification Factor and/or NCHRP crash prediction tools		Potential for incorporating geolocated crash data into Roads and Highways Geodatabase to identify trends and evaluate metric. Assess safety of new improvements compared to existing safety conditions. Investment in tools and training regarding predictive safety analysis could benefit design and HSIP.	Staff training for planning level predictive safety modeling tools	Resources: NCHRP 17-58, <i>Safety Prediction Models for Six-Lane and One-Way Urban and Suburban Arterials</i> ; NCHRP 17-45, <i>Enhanced Safety Prediction Methodology and Analysis Tool for Freeways and Interchanges</i> methods; and the most current <i>Highway Safety Manual</i>
Accessibility / Economic Development	Directly increases access for disadvantaged populations	Very high = X points High = X points Medium = X points Low = X points	Census data, Roads and Highways Geodatabase		Addresses environmental justice. Add mapping of composite score (low, medium, high, very high) into Roads and Highways Geodatabase to use for other analyses and planning activities.	Requires developing a composite equity score using Census data such as minority race, age, population below poverty, disability, educational attainment, access to motor vehicle	Also discussed in Alaska Statewide Active Transportation Master Plan – this approach combines multiple demographic variables, or indicators, into a single measure or score
Multimodal Enhancements	Resolves a documented deficiency/need	Yes = Full points No = No points	Statewide Non-motorized Plan, MPO or local non-motorized plans		-	Non-motorized plans with documented needs are generally only available in urban areas	-
	Improves connectivity for pedestrians and/or bicycles	New multimodal facility = full points Improves existing facility = half points No multimodal improvements = no points	Roads and Highways Geodatabase		-	-	Some states include transit to address Federal Planning Factor

<div> <div>Table 3. Capacity Expansion</div> <div>(add new lanes, new routes, new intersections, intersection capacity enhancements)</div> </div>							
Criteria For Consideration	Metric	Example Scoring	Proposed Data Source	Example Weighting	Opportunities	Challenges	Other Comments
Prioritized as State of Good Repair Project	Addresses a prioritized asset management need	Within top X of list = full points Between X and X = half points Below X = partial points Not on list = no points	PMS and/or AASHTOWARE prioritized project lists		Projects that solve multiple problems score higher	PMS and AASHTOWare are not yet at full capacity	-
Land Use and Transportation Plan Consistency	Level of consistency with DOT&PF statewide and regional Plans	Consistent = Full points Partially Consistent = Half Points Not Consistent = No Points	DOT&PF statewide plans, regional plans		Linking the 'family of plans,' starting with the 2020/2021 LRTP update	Regional Plan update frequency varies	When a screening process is implemented, this criterion could be deleted. Projects that are not consistent with DOT&PF statewide plans should not advance into the STIP based on performance-based planning processes
	Level of consistency with external local plans (borough, tribal and/or municipal)	Consistent = full points Partially consistent = half points Not consistent = no points	Municipal, borough, tribal plans		Facilitate alignment of plans for NHS roadways with local jurisdictions	Not all areas of the state have local governments or planning documents and for those that do, plans across jurisdictions are not always in alignment. Need to devise scoring for "no documents" or this criterion could penalize rural area	Recommend DOT&PF prioritizes a list of plans in coordination with MPOs, boroughs and tribes based on importance (i.e. Tier 1 – X Points, Tier 2 – X points, etc.)
Corridor Significance	Designated safety corridor	Ranked in top X = full points Ranked X to X = half points Ranked x or below = partial points In MPO or Vision Zero Plan as safety concern = partial points	Highway Safety Plan, State Designation, Vision Zero or MPO planning document		Addition of safety corridor layer to Roads and Highways Geodatabase	Does not consider expected benefits of project	-
	Strategically significant for connectivity to communities or resources	Only road = full points 1 additional road = partial points >2 roads = no points	Roads and Highways Geodatabase		Addresses environmental justice, economic development	Will need to define "strategically significant."	Some roadways are strategically significant for the connections provided between points or areas of statewide significance
	Designated critical freight corridor	Primary = full points Intermodal connector = partial points Critical urban = partial points Critical rural = partial points	Statewide Freight Plan, AMATS or FAST Planning Freight Plans		Addition of freight corridor layer to Roads and Highways Geodatabase	-	Develop point system for type of freight route. For example, primary freight system; intermodal connector, critical urban freight corridor, critical rural freight corridor
Mobility	Future level of service (LOS) - segment or intersection	LOS E = full points LOS C, D = half points LOS A, B = no points	Planning-level future LOS based on service volume tables		Staff training for publicly available resources; potential future research project to customize thresholds for Alaska	Consistency of staff familiarity with planning level LOS analysis	Generalized planning to determine a need for additional capacity. Example FDOT planning-level LOS threshold tables are attached
	Identified freight bottleneck	Yes = full points No = no points	Statewide Freight Plan, AMATS or FAST Planning Freight Plans		Addition of freight bottleneck layer to Roads and Highways Geodatabase	-	-







Criteria For Consideration	Metric	Example Scoring	Proposed Data Source	Example Weighting	Opportunities	Challenges	Other Comments
Mobility	Daily usage (AADT)	>X (rural), >Y (urban) = full points X to X (rural), Y to Y (urban) = half points <X (rural), <Y (urban) = no points	Most recent year AADT - C2-Cloud, Roads and Highways Geodatabase		-	-	-
	Freight volume as percentage of AADT (CAADT)	+ X% CAADT = full points X to X % CAADT = half points <X% CAADT = no points			Potential economic benefit measurement	CAADT is not currently a layer built into Roads and Highways Geodatabase	-
	Travel time savings; minutes of delay; variability - passenger vehicles	>X minutes = full points X to X minutes = half points <X minutes = no points	National Performance Management Research Data Set (NPMRDS); Highway Performance Monitoring Systems, FHWA Occupancy Factors; RITIS		FAST Act performance target monitoring	Travel Time data can be limited in more remote sections of the NHS with limited/no cellphone coverage	-
Safety	Expected crash reduction (crash modification factors, crash reduction factor)	> X crash reduction = full points X to X crash reduction = half points <X crash reduction = no points	Alaska CARE, HSIP, Crash Modification Factor and NCHRP crash prediction tools		Potential for incorporating geolocated crash data in GIS to identify trends and evaluate metric. Assess safety of new improvements compared to existing safety conditions. Investment in tools and training regarding predictive safety analysis could also benefit design and HSIP	Staff training for planning level predictive safety modeling tools	Resources: NCHRP 17-58, <i>Safety Prediction Models for Six-Lane and One-Way Urban and Suburban Arterials</i> ; NCHRP 17-45, <i>Enhanced Safety Prediction Methodology and Analysis Tool for Freeways and Interchanges</i> methods; and the most current <i>Highway Safety Manual</i>
Freight Movement	Minutes of delay; variability – freight vehicles	>X minutes = full points X to X minutes = half points <X minutes = no points	NPMRDS; HPMS, FHWA Occupancy Factors; RITIS		Staff training for reliability analysis	Consistency of Familiarity with Reliability Analysis, Travel Time data can be limited in areas with limited/no cellphone coverage	-
Return on Investment	Benefit cost score	>X = full points <X = no points	CARE, Alaska Highway Preconstruction Manual Section 1130.6, per mile standard unit construction costs, most recent year GIS AADT; volume tables		Staff training for planning-level cost effective analysis; standardized spreadsheet tool with associated training	Numerous ways to calculate the 'benefit' and a standardize method and training will be required	A standardized methodology will need to be selected for computing the cost-benefit score. While planning-level estimate as to the 'cost' of a project can be determined from historical project development and construction costs, DOT&PF, other agencies and national research boards have developed numerous ways of computing project 'benefit' scores

Table 3. Capacity Expansion
(add new lanes, new routes, new intersections, intersection capacity enhancements)




Criteria For Consideration	Metric	Example Scoring	Proposed Data Source	Example Weighting	Opportunities	Challenges	Other Comments
Accessibility / Economic Development	Directly increases access for disadvantaged populations	Very high = X points High = X points Medium = X points Low = X points	Census data, Roads and Highways Geodatabase		Addresses environmental justice. Add mapping of composite score (low, medium, high, very high) into Roads and Highways Geodatabase to use for other analyses and planning activities	Requires developing a composite equity score using Census data such as minority race, age, population below poverty, disability, educational attainment, access to motor vehicle	Also discussed in Alaska Statewide Active Transportation Master Plan — this approach combines multiple demographic variables, or indicators, into a single measure or score
Multimodal Enhancements	Resolves a documented deficiency/need	Yes = full points No = no points	Statewide Non-motorized Plan, MPO or local non-motorized plans		-	Non-motorized plans with documented needs are generally only available in urban areas	-
	Improves connectivity for pedestrians and/or bicycles	New multimodal facility = full points Improves existing facility = half points No multimodal improvements = no points	Roads and Highways Geodatabase		-	-	Some states include transit to address Federal Planning Factor

Table 4. Major Capacity Expansion
(signalized intersection to interchange conversion, adding lanes to highway)

Criteria For Consideration	Metric	Example Scoring	Proposed Data Source	Example Weighting	Opportunities	Challenges	Other Comments
Prioritized as State of Good Repair Project	Addresses prioritized asset management need	Within top X of list = full points Between X and X = half points Below X = partial points Not on list = no points	PMS and/or AASHTOWARE prioritized project lists		Projects that solve multiple problems score higher	PMS and AASHTOWare are not yet at full capacity	Could modify scoring of this metric for Major Capacity Projects to use a \$ value threshold
Land Use and Transportation Plan Consistency	Level of consistency with DOT&PF statewide and regional plans	Consistent = full points Partially consistent = half points Not consistent = no points	DOT&PF statewide plans, regional plans		Linking the 'family of plans,' starting with the 2020/2021 LRTP update	Regional plan update frequency varies	When a screening process is implemented, this criterion could be deleted. Projects that are not consistent with DOT&PF statewide plans should not advance into the STIP based on performance-based planning processes
	Level of consistency with external local plans (borough, tribal and/or municipal)	Consistent = full points Partially consistent = half points Not consistent = no points	Municipal, borough, tribal plans		Facilitate alignment of plans for NHS roadways with local jurisdictions	Not all areas of the state have local governments or planning documents and for those that do, plans across jurisdictions are not always in alignment. Need to devise scoring for "no documents" or this criterion could penalize rural area	Recommend DOT&PF prioritizes a list of plans in coordination with MPOs, boroughs and tribes based on importance (i.e. Tier 1 – X Points, Tier 2 – X points, etc.)
Corridor Significance	Designated safety corridor	Ranked in top X = full points Ranked X to X = half points Ranked below X = partial points In MPO or Vision Zero Plan as safety concern = partial points	Highway Safety Plan, State Designation, Vision Zero or MPO planning document		Addition of safety corridor layer to Roads and Highways Geodatabase	Does not consider expected benefits of project	-
	Strategically significant for connectivity to communities or resources	Only road = full points 1 additional road = partial points >2 Roads = no points	Roads and Highways Geodatabase		Addresses environmental justice, economic development	Will need to define 'strategically significant'	Some roadways are strategically significant for the connections they provide between points or areas of statewide significance
	Designated critical freight corridor	Primary = full points Intermodal connector = partial points Critical urban = partial points Critical rural = partial points	Statewide Freight Plan, AMATS or FAST Planning Freight Plans		Addition of freight corridor layer to Roads and Highways Geodatabase	Much of the NHS is designated as a freight route.	Develop point system for type of freight route. For example, primary freight system; intermodal connector; critical urban freight corridor; critical rural freight corridor
Mobility	Future level of service (LOS) segment or intersection	LOS E = full points LOS C, D = half points LOS A, B = no points	Planning level future LOS based on service volume tables		Staff training for publicly available resources; potential future research project to customize thresholds for Alaska	Consistency of staff familiarity with planning-level LOS analysis	Generalized planning to determine a need for additional capacity. Example FDOT planning-level LOS threshold tables are attached
	Identified freight bottleneck	Yes = full points No = no points	Statewide Freight Plan, AMATS or FAST Planning Freight Plans		Addition of freight bottleneck layer to Roads and Highways Geodatabase	-	-
	Daily usage (AADT)	>X (rural), >Y (urban) = full points X to X (rural), Y to Y (urban) = half points <X (rural), <Y (urban) = no points	Most recent year AADT - C2-Cloud, Roads and		-	-	Minnesota uses different AADT thresholds for scoring urban and rural projects

Criteria For Consideration	Metric	Example Scoring	Proposed Data Source	Example Weighting	Opportunities	Challenges	Other Comments
Mobility	Freight volume as percentage of AADT (CAADT)	>X% CAADT = full points X -X% CAADT = half points <X% CAADT = no points	Highways Geodatabase		Potential economic benefit measurement	CAADT is not currently a layer built into Roads and Highways Geodatabase	-
	Travel time savings; minutes of delay; variability - passenger vehicles	>X minutes = full points X to X minutes = half points <X minutes = no points	NPMRDS Data Set; HPMS, FHWA Occupancy Factors; RITIS		FAST Act performance target monitoring	Travel time data can be limited in areas with limited/no cell phone coverage	-
Safety	Expected crash reduction (crash modification factors, crash reduction factor)	> X crash reduction = full points X to X crash reduction = half points <X crash reduction = no points	Alaska CARE, HSIP, Crash Modification Factor and/or NCHRP crash prediction tools		Potential for incorporating geolocated crash data in GIS to identify trends and evaluate metric. Assess safety of new improvements compared to existing safety conditions. Investment in tools and training regarding predictive safety analysis could also benefit design and HSIP	Staff training for planning-level predictive safety modeling tools	Resources: NCHRP 17-58, <i>Safety Prediction Models for Six-Lane and One-Way Urban and Suburban Arterials</i> ; NCHRP 17-45, <i>Enhanced Safety Prediction Methodology and Analysis Tool for Freeways and Interchanges</i> methods; and the most current <i>Highway Safety Manual</i>
Freight Movement	Minutes of delay variability - freight vehicles	>X minutes = full points X to X minutes = half points <X minutes = no points	NPMRDS Data Set; HPMS, FHWA Occupancy Factors; RITIS		Staff training for reliability analysis FAST Act performance target monitoring	Consistency of familiarity with reliability analysis, travel time data can be limited in areas with limited/no cell phone coverage	-
Return on Investment	Benefit cost score	>X = full points <X = no points	CARE, Alaska Highway Preconstruction Manual Section 1130.6, per mile standard unit construction costs, most recent year GIS AADT; volume tables		Staff training for planning-level cost effective analysis; standardized spreadsheet tool with associated training	Numerous ways to calculate the 'benefit,' and a standardized method and training will be required	A standardized methodology will need to be selected for computing the cost-benefit score. While planning-level estimate as to the 'cost' of a project can be determined from historical project development and construction costs, DOT&PF, other agencies and national research boards have developed numerous ways of computing project 'benefit' scores
Accessibility / Economic Development	Directly increases access for disadvantaged populations	Very high = X points High = X points Medium = X points Low = X points	Census data, Roads and Highways Geodatabase		Addresses environmental justice. Add mapping of composite score (low, medium, high, very high) into Roads and Highways Geodatabase to use for other analyses and planning activities	Requires developing a composite equity score using Census data such as minority race, age, population below poverty, disability, educational attainment, access to motor vehicle	Also discussed in Alaska Statewide Active Transportation Master Plan—This approach uses combined multiple demographic variables, or indicators, into a single measure or score
Multimodal Enhancements	Resolves a documented deficiency/need	Yes = full points No = no points	Statewide Non-motorized Plan, MPO or local non-motorized plans		-	Non-motorized plans with documented needs are generally only available in urban areas	-
	Improves connectivity for pedestrians and/or bicycles	New multimodal facility = full points Improves existing facility = half points No multimodal improvements = no points	Roads and Highways Geodatabase		-	-	Some states include transit to address Federal Planning Factor



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