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PENNDOT STATE ROAD MAINTENANCE PLANNING

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PennDOT Projects Planning and Scheduling

While owning and maintaining 39,706 miles of roads and 25,420 bridges, residents, motorists, and municipal officials often ask how PennDOT prioritizes its maintenance plan. In fact, planning is a huge part of PennDOT's process.

Common maintenance activities may not receive as much public attention as building new bridges or highways, but they are integral to PennDOT's infrastructure. Core maintenance operations are planned on recurring cycles to effectively manage and preserve assets. While maintenance planning is difficult because of the many variables including resources, budgets, and competing needs, it is possible to plan and schedule maintenance activities effectively and efficiently. Adherence to the policies and procedures helps to provide a structured process for maintenance planning.

The county maintenance planning process includes recommended planning and scheduling for maintenance operations, beginning with a needs assessment of the roadways and bridges to be maintained and ending with overall monitoring of the plan.

The county management team works together to develop and monitor county-wide operational plans. The team consists of the highway maintenance manager, the assistant highway maintenance managers, the roadway programs coordinator, the highway equipment manager, and the foremen. Each member of the county management team works together to ensure that plans are followed, and resources are maximized. Municipal public works leaders are encouraged to develop an open line of communication with county staff.

PennDOT Long Range (Strategic Planning)

The highest level of planning is long-range planning, also referred to as "strategic planning." Strategic planning is defined as "the process of determining an organization's long-term goals and then identifying the best approach for achieving these goals." Typically, a county's long-range plan reflects PennDOT's statewide and district goals and objectives for maintaining and improving roadways and bridges.

Various PennDOT staff are actively involved in the planning process and are a liaison for Metropolitan and Rural Planning Organizations (MPOs and RPOs), the State Transportation Commission, the Transportation Advisory Committee, as well as the public and other stakeholders. The product of PennDOT's long-range planning efforts at the highest level is the 12-Year Program, a medium-range statewide plan that assigns funding to projects. At the regional level are the Transportation Improvement Programs (TIPs), which are four years in scope and updated every two years. As it pertains to the roadway network, each TIP principally includes routes that are part of the National Highway System (NHS), Business Plan Network 1 (interstate), and Business Plan Network 2 (NHS non-interstate). TIPs are often referred to as PennDOT's capital program. District maintenance staff, in cooperation with the county maintenance

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management staff develop the Surface Improvement Plan (SIP), which reflects PennDOT's goals and objectives for maintaining and improving the roadway network.

Each year, the PennDOT district and county offices are required to update their SIP. The plan includes projected miles and dollars for several categories (listed below). The county offices are required to establish a five-year SIP using department staff and maintenance contracts. The following are the current categories included on the SIP:

- Betterment,
- Resurfacing,
- Concrete pavement rehabilitation,
- Widening,
- Leveling and sealing, and
- Surface repair.

The specific categories included on the plan could change depending on the long-term goals and objectives in place at the time. The SIP is a driving force in the preparation of county budgets and Calendar Year Plans. The SIP also identifies locations where preparation work (e.g., pipe replacement, shoulder cutting, etc.), utility work, and right-of-way acquisitions will be needed to support the plan.

PennDOT Sectional Cycle Maintenance Plan

Sectional cycle maintenance is based on establishing geographical areas and cyclical maintenance schedules, whereas reactive or demand maintenance is based on addressing needs as they arise. Benefits of sectional cycle maintenance are increased efficiencies and reduced mobilization costs, effective asset management by systematically reducing "out-of-cycle" activities, and the ability to effectively anticipate resource and budget impacts.

Cyclical maintenance can be viewed in two categories:

1. Cyclical condition maintenance activities are completed annually at the same predetermined locations. Mowing, bridge cleaning, and roadway sweeping are examples of core, cyclical condition maintenance activities. Some condition maintenance activities can be performed on an annual cycle, while others may require attention several times each year.
2. Cyclical network preservation activities are completed at the same predetermined locations over a period of years, or cycles. The predominant core, cyclical network preservation activities are sealcoat, crack seal, shoulder cutting, side dozing, and drainage activities.

To develop a balanced, long-term Sectional Cycle Maintenance Plan, it is critical that the county management team have thorough knowledge of the roadway networks in the county. Business plan network and roadway treatment designation (high/low-level, concrete, unpaved, recycled) mileage within a county, as well as pavement treatment cycle requirements for each activity (reference Publication 23, Chapter 7 and Publication 242, Chapter 11) are the basis for determining and establishing planning cycles and geographic sections.

The network preservation activities required to be completed on each treatment network, in conjunction with a mileage breakdown of each treatment network, are the main factors to establishing effective cycle frequencies, and the number of geographical sections needed for the county. For this purpose, high-level roadways are referred to as the crack seal network, while low-level/recycled roadways are generally referred to

as the sealcoat network. In most cases, the low-level/recycled sealcoat network will be the basis by which this optimum frequency is established.

The management team will determine what the optimum cycle is that they can support long term. Many factors are considered, such as budget, resources, condition of network, etc. A county may adjust the cycle interval of core maintenance activities to fit the needs of the county but must never go below the minimum frequency required by policy (Publication 242 Chapter 11). If they do, then the risk of roadways being "out-of-cycle" increases, which may lead to increased maintenance costs and poor surface conditions over time. Once the optimum cycle is determined, a more detailed review of the county network is necessary to define the physical breakdown of each geographic section (cycle maintenance section). When defining the physical limits, each section should be as close to the established target miles and as balanced as possible. The mileage between geographical sections could vary due to operational needs or geographic barriers (i.e., mountains, rivers, etc.).

It is important once a Cycle Maintenance Plan has been established, to try and not to deviate between cycle frequencies. If actual field conditions consistently dictate activities regularly needing to be performed earlier or later than the established cycle, it may warrant the county revaluating their cycle and adjusting the overall program.

Once the county cycles and geographic sections have been determined, maintenance goals for each section should be quantified for each activity. Sealcoat is primarily performed on the low-level network and resurfacing on the high-level network. However, crack seal shall also be performed on low-level roads as a preparatory item prior to sealcoat, if warranted, and sealcoat may need to be performed on high-level roadways on occasion. Other cyclical maintenance activities are performed on all treatment networks, such as shoulder cutting and side dozing. Knowledge of the county's network and assets are essential to establishing these maintenance goals. For instance, curbed areas or physical barriers will impact total cuttable miles of shoulder cutting required on a road.

Another important aspect of developing a long term, Sectional Cycle Maintenance Plan is sequencing operations to ensure preparatory work is completed prior to any surface improvement project. Since sealcoat is the operation that drives the surface improvement projects in most cases, a plan outlining the necessary preparatory activities in advance of sealcoat is prudent. Clearly defining what activities are to be done and in what geographical section builds more sustainability into the long-range plans. County management teams have the flexibility to determine what operation is driving the long-range plans, but regardless of the operation, preparatory work in advance of that operation should be determined.

Once the Sectional Cycle Maintenance Plan is established, it is essential that progress is constantly monitored for circumstances that may have negatively impacted project completion, such as a major weather event that diverted resources to reactive maintenance activities. PennDOT typically monitors the calendar year goals and the five-year rolling average to analyze if the cycle goals are being met or determine when adjustments are necessary.

PennDOT Roadway and Bridge Needs Assessment

Identifying maintenance needs on roadways and bridges, through a Roadway Condition Survey, is one of the most important activities performed by each county. Data collected in this process, along with customer concerns, represents the foundation on which each level of maintenance planning is built from long-range planning to Calendar Year Plan development, and to weekly planning. At least once per year

(late summer/early fall), each assistant highway maintenance manager shall be responsible for seeing that a Roadway Condition Survey is completed to identify all the maintenance needs for each state route assigned to them. Examples of the data collected includes the following: overall pavement condition and deficiencies to include potholes, base repairs and crack sealing, shoulder condition, drainage activities to include pipe flushing and inlet and outlet cleaning, guiderail repairs, bridge maintenance and cleaning, condition of line painting, sweeping, signs, vegetation management to include mowing, spraying, seeding, tree trimming, and litter or tire casing removal.

For more information on common maintenance activities, visit the PennDOT Maintenance Activities webpage.

PennDOT Bridges

With more than 25,400 state-owned highway bridges greater than or equal to eight feet in length, Pennsylvania has the third-largest number of bridges in the nation. The average age of bridges on the state system is over 50 years old.

PennDOT is committed to maintaining and improving bridges through bridge preservation activities, including annual cleaning, painting, deck joint repair or replacement, rigid deck overlays, etc. In the long run, preservation saves money by extending bridge service life, thus deferring the need for major rehabilitation of bridges.

PennDOT conducts approximately 18,000 inspections each year on the state-owned highway bridges. Inspection intervals are set based on each bridge's condition ratings and several other criteria. These intervals typically range from six up to a maximum of 48 months. PennDOT has oversight responsibility of 6,600 locally owned bridges greater than 20 feet in length. This oversight includes monitoring to ensure they are inspected timely, that reports are provided to the local bridge owner, and to collaborate with the bridge owner on any required work where necessary.

Information on bridge safety inspections, plans, and specifications can be found on the PennDOT Bridges webpage.

PennDOT Maintenance Calendar Year Plan

The Calendar Year Plan identifies what maintenance assemblies will be performed by PennDOT throughout the calendar year; who will perform the work (i.e., department force or maintenance contract); how much planned production units need to be completed; and when and where the work will take place for all planned work items. It is also used to ensure operations are performed in the right sequence (e.g., necessary preparatory work such as pipe replacements, patching, crack seal, etc. are completed prior to any roadway resurfacing). The Calendar Year Plan is the primary document used by the county in developing weekly plans. It is important to note that work is coordinated with many other private or public roadway users and stakeholders. For example, other planned department work (i.e., construction contracts or maintenance contracts), Highway Occupancy Permits (HOP), utility projects, or other unique events (i.e., festivals, parades, etc.).

PennDOT Maintenance Weekly Planning

The weekly planning meeting provides the opportunity to coordinate the use of available resources (manpower, equipment, materials, etc.) to ensure work identified in the preceding planning efforts (i.e., Calendar Year Plan) is completed. It also provides the opportunity to communicate priorities and review the status of performance measures and key reports. As such, it is one of the most important functions performed at the county level. The PennDOT Regional Office (district) webpage has the district office contact information and the most recent news releases from the PennDOT District.

Resources

12-Year Program: https://talkpatransportation.com/2023TYP/index.html

PennDOT's Transportation Improvement Program (TIP): https://gis.penndot.gov/paprojects/TIP.aspx

Publication 23: https://www.dot.state.pa.us/public/PubsForms/Publications/PUB%2023/PUB%2023.pdf

Publication 242: https://www.dot.state.pa.us/public/PubsForms/Publications/PUB%20242.pdf

PennDOT Maintenance Activities: https://www.penndot.pa.gov/about-us/MaintenanceActivities/Pages/default.aspx

PennDOT Bridges: https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Pages/default.aspx

PennDOT Regional (District) Offices: https://www.penndot.pa.gov/RegionalOffices/Pages/default.aspx