Develop an Asset Management Tool for Collecting and Tracking Commitments on Selected Environmental Mitigation Features

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DEVELOP AN ASSET MANAGEMENT TOOL FOR COLLECTING AND TRACKING COMMITMENTS ON SELECTED ENVIRONMENTAL MITIGATION FEATURES

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DISCLAIMER

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16. Abstract Wisconsin has constructed many environmental mitigation projects in conjunction with transportation projects that have been implemented according to the National Environmental Policy Act. Other mitigation projects have been constructed pursuant to discussions and negotiations with the Wisconsin DNR. These projects offset or replace a certain environmental function(s) lost as a result of construction of the transportation project. Examples include storm water management facilities, stream restoration projects, construction of sound walls, replacement of parklands and wildlife crossing structures. In order for the environmental mitigation projects to continue to provide long term functionality intended when they were first constructed, they must be properly maintained, and when necessary, rehabilitated or reconstructed. These environmental mitigation projects may be considered as assets similar to other transportation features. Wisconsin DOT (WisDOT) has identified the need for a better inventory management of the selected features in the overall scheme of project development and ongoing maintenance.			
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Executive Summary

Wisconsin has constructed many environmental mitigation projects in conjunction with transportation projects that have been implemented according to the National Environmental Policy Act. Other mitigation projects have been constructed pursuant to discussions and negotiations with the Wisconsin DNR (WDNR). These projects offset or replace a certain environmental function(s) lost as a result of construction of the transportation project. Examples include storm water management facilities, stream restoration projects, construction of sound walls, replacement of parklands and wildlife crossing structures.

In order for the environmental mitigation projects to continue to provide long term functionality intended when they were first constructed, they must be properly maintained, and when necessary, rehabilitated or reconstructed. These environmental mitigation projects may be considered as assets similar to other transportation features.

WisDOT has identified the need for a better inventory and management of the selected features in the overall scheme of project development and ongoing maintenance.

The objective of this project was to explore the current state of environmental mitigation project activities, explore the literature on existing environmental inventory and asset management programs and develop an inventory of selected environmental mitigation features in Wisconsin. Specific objectives of the project are to:

- Collect documentation on existing cultural resources, hazardous materials, wetlands, and wildlife accommodation commitments throughout Wisconsin to compile an inventory of such information.

- Provide a review of the state of the practice in other states and municipalities for collecting and tracking environmental commitments. Perform a detailed investigation of the reports contained in WisDOT Transportation Synthesis Report (T.S.R.) on this topic dated 02/28/2008 provided by WisDOT.

- Develop an electronic inventory and asset management tool to assist WisDOT managers in collecting this information.

- Provide recommendations for additional inventory features by commitment, feature type, and primary maintenance responsibilities.

WisDOT has a history of environmental management and asset management. Environmental considerations have long been taken into account when planning transportation projects, in accordance with the Wisconsin Environmental Policy Act (WEPA). Many research projects and maintenance programs have been dedicated to maintenance, quality and assurance of assets such as roadways and bridges. However, WisDOT has not had an all-inclusive program dedicated to ongoing maintenance of environmental features associated with road projects. This gap was seen as an opportunity for improvement, which initiated the research conducted for this project.

The development of an inventory and tool for collecting and tracking environmental commitments will assist in the development of a full asset management system for environmental mitigation features. This tool will help WisDOT provide the long term functionality intended when the mitigation features were first constructed by assisting staff in identifying environmental commitments that need maintenance and monitoring, and providing information about how that maintenance and monitoring should be conducted. This inventory and tool will assist WisDOT managers in identifying and tracking regulatory and pledged commitments. This tool will help in the generation of periodic environmental reports. Ultimately, the use of an asset management system can help drive the design and

construction of future projects by identifying good practices for environmental mitigation commitments as well as those that may not be cost effectively achieving their intended goals.

The tasks of the project included:

- Review existing studies and asset management systems for environmental features. This literature review will include analysis with particular focus on Section 106 compliance for cultural resources, (historic properties & archaeology sites), wetlands, hazardous materials, and wildlife accommodations commitments.
- Meet with WisDOT personnel in regions and central office, and Wisconsin DNR (WDNR) "Liaisons" as identified by WisDOT environmental staff to review existing procedures for collecting and tracking environmental commitments. Meetings with WisDOT and WDNR personal shall be coordinated through a WisDOT Environmental office contact.
- Develop list of recommendations of priority environmental features for further exploration. These may include noise barriers, retaining walls, air quality, culverts or crossings.
- Develop and test tools and recommended processes to inventory and track past, current, and future projects.
- Develop pertinent case studies. The research team will review plans at WisDOT archives, as-builts and thoroughly document current conditions of three case studies.
- Discuss barriers to implementation and describe opportunities for continued development of technical tools for tracking.
- Develop implementation strategies and provide guidance for using the tool to WisDOT managers.

Results of agency interviews, literature research, and agency documents shows that development and use of a tracking system for environmental commitments that needs ongoing maintenance and monitoring would be beneficial to department and staff efficiency as well as to the overall well being of Wisconsin's ecological resources.

Research has identified specific types of environmental commitments that are recommended to be prioritized for monitoring and maintenance. Also, best practices for monitoring and maintenance have been identified and recommendations regarding these strategies have been included in the report.

An inventory of existing commitments requiring monitoring and maintenance has been developed, as well as a tool for tracking such commitments. These can be found in the Appendix. Also in the Appendix is a user guide to facilitate us of the tracking tool.

There is good potential for full implementation of the tracking program. The tracking tool was designed using the Microsoft Office Excel program. This program was chosen based on recommendations of WisDOT staff, especially at the request of Dan Scudder, Chief of Environmental Services Section, WisDOT. Despite other programs having more sophisticated tools for tracking, Excel was chosen for its user-friendliness, staff familiarity with the program, and easy data sharing. The literature review pointed to other agencies staff needing to learn a new computer program as a primary barrier in program implementation. Data input was designed to be at a minimum in recognition that the more data a tracking program requires the easier it is for staff to fall behind in entry and therefore abandon program use. At this point, it is not possible to link this tracking tool with other programs used by WisDOT such as PMP, as these other programs currently lack such capability. Additional barriers to use are discussed in section XIII of this report.

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I. Introduction

A. Defining the Problem

In accordance with the National Environmental Policy Act (NEPA) and the Wisconsin Environmental Policy Act (WEPA), state transportation projects must take environmental impacts into account during the planning process. The intent is to avoid impacts or minimize or mitigate impacts if they cannot be avoided. One way in which mitigation takes place is through environmental commitments made by the Wisconsin Department of Transportation during the planning process. Commitments are made based on specific projects locations, sensitive environments, and potential for negative impacts. They are commonly determined and documented through inter-agency communications including meetings, letters and memorandums of understanding.

These commitments can be divided into two categories: those that are fulfilled and completed during the construction process, and those that may need ongoing maintenance or monitoring in order to fulfill their ecological purpose after the project has been completed.

The research for this project focuses on the second category, those commitments which require ongoing maintenance and monitoring after project completion. WisDOT has acknowledged that tracking of these features has not been an integrated part of the environmental management system, a statewide tracking tool does not exist, and a coordinated system is not in place for maintenance and monitoring of such features. Most staff has commented that once a project is completed, everyone "walks away" and funding for such maintenance is non-existent.

WisDOT acknowledges a value in tracking such environmental commitments. There is both a need and a responsibility to meet the maintenance and monitoring needs of such features in order to embrace the environmental ethic and responsibilities outlined in NEPA and WEPA regulations.

Additionally, tracking these commitments allows for other benefits as discussed more in depth in following chapters, such as improved design and functionality, and reduced cost of mitigation projects.

B. Finding Solutions: Building upon Wisconsin's Environmental Ethic

Wisconsin has an environmental ethic with a long and rich history. Many important perspectives regarding conserving and preserving natural resources came from Wisconsin naturalists such as conservationist John Muir (1838-1984) (1) and Ecologist, Forester, and Environmentalist Aldo Leopold (1887-1948) (2). Their voices urged a land ethic as outlined in Leopold's *A Sand County Almanac.* Published in 1849, Leopold advocated for considerations of land to be about more than economics, but intrinsic environmental value of land.

Leopold redefined the relationship between people and the environment, which formed much of the philosophical basis of the conservation movement. According to Leopold "The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land" (2). With this understanding, a responsibility was understood to belong to the citizens of a place to protect and preserve it. "A land ethic, then," Leopold said "reflects the existence of an ecological conscience, and this in turn reflects a conviction of individual responsibility for the health of land" (2).

This Land Ethic can be found in the policies established by the National Environmental Policy Act (NEPA) and Wisconsin Environmental Policy Act (WEPA). These acts require non-economic values of the sociological and

ecological communities to be acknowledged and protected during the transportation planning process. Environmental Impact Statements (EIS) and Environmental Assessments (EA) require that wildlife habitat, waterways, wetlands, plants and other environmental features be considered.

This research project demonstrates that WisDOT embraces that environmental ethic and seeks to continue improving its internal processes in regard to environmental management and protection during the transportation planning process.

This project has set objectives to improve upon that environmental ethic by identifying commitments that have been made that need ongoing maintenance and monitoring. An inventory of existing commitments has been developed as well as a tracking tool. The tool will be made available to WisDOT staff to track maintenance and monitoring of these existing commitments and future commitments. The project also develops a list of priority features that should be considered for tracking in the future.

C. Summary and Report Outline

1. How the project was selected

This project was selected based on identification of benefits that would be gained by maintaining and monitoring selected environmental features. Obstacles to maintenance included lack of information about these features, such as specific design, location, and what maintenance is needed. Also, it was identified that new staff had no way to be aware of the existence of such features. While WisDOT has other maintenance quality and assurance programs, it became evident that there was a need to assure that environmental commitments were meeting their ecological goals and providing their intended ecological purpose.

2. Objectives

The goal of this project was to explore the current state of environmental mitigation project activities, explore and discuss the literature on existing environmental inventory & asset management programs and develop an inventory of selected environmental mitigation features in Wisconsin. Specific objectives of the project were to:

- Collect and compile documentation on existing categories of commitments throughout Wisconsin to compile an inventory of such information.
- Provide a review of the state of the practice in other states and municipalities for collecting and tracking environmental commitments. Perform a detailed investigation of the reports contained in WisDOT Transportation Synthesis Report (T.S.R.) on this topic dated 02/28/2008 provided by WisDOT.
- Develop an electronic inventory and asset management tool to assist WisDOT managers in collecting this information.
- Provide recommendations for additional inventory features by commitment and feature type and primary maintenance responsibilities.

3. Methodology

Methodology involved conducting a review of existing studies and asset management systems for environmental features. The literature review included an analysis with particular focus on Section 106 compliance for cultural resources including historic properties & archaeology sites, and wildlife accommodations commitments.

Additionally, interviews were conducted with WisDOT personnel and Wisconsin DNR (WDNR) Liaisons as identified by WisDOT environmental staff to review existing procedures for collecting and tracking environmental

commitments. Meetings with WisDOT and WDNR personnel were coordinated through a WisDOT Environmental office contact. A list of WisDOT Personnel whom were interviewed can be found at the beginning of this report.

Research of existing environmental commitments was conducted by conducting interviews with WisDOT and WDNR staff, visiting WisDOT sites and reviewing Environmental Impact Statements and Environmental Assessments in order to develop a list of existing environmental commitments that need monitoring and maintenance.

4. Literature Review

The purpose of the literature review was to provide information regarding the state of the practice in other states and municipalities for collecting and tracking environmental commitments. Currently, nearly all agencies' environmental commitment tracking taking place is done during construction, not for maintenance and monitoring of ongoing environmental commitments after completion of a project. Nevertheless, there are sufficient lessons to be learned from existing systems and tools. No state has exhibited a stand-alone or integrated tracking system for ongoing commitments; however, several states have exhibited components of such a program. Several states, such as Oregon and Washington, have suggested that they plan to develop a tracking system for ongoing environmental commitments or to incorporate such monitoring and maintenance issues into existing management systems.

The literature review is included in the Appendix and is organized according to the types of tools utilized by states for commitment tracking.

D. Tracking Challenges

Currently there are several challenges that exist in tracking ongoing environmental commitments:

- WisDOT does not have a program and process for tracking, so any tracking that could take place would be ad hoc.
- Some personnel feel there is insufficient staff time and resources for tracking.
- Currently there is insufficient funding and staff resources for providing the required maintenance and monitoring, and there is no systematic process for maintenance of environmental features.
- Staff is less likely to dedicated time to tracking if they feel there will be no maintenance that actually takes place. Therefore, a commitment to follow through with maintenance needs, and establishment of a budget for doing so, may be necessary to encourage use of tracking tools.

II. What is an Environmental Commitment?

A. Definitions:

1. National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) was signed into law on the first day of 1970. “NEPA established a national policy to protect the environment, created a Council on Environmental Quality (CEQ), and required that Environmental Impact Statements be prepared for major federal actions having a significant effect on the environment” (3).

Due to NEPA regulations, government agencies have incorporated environmental quality concerns into the decision-making process. Few projects move forward today that provoke an environmentally unsatisfactory rating from the Environmental Protection Agency. Many projects contain environmental safeguards that would not have resulted without requirements of NEPA.

“Title I of NEPA contains a Declaration of National Environmental Policy which requires the federal government to use all practicable means to create and maintain conditions under which man and nature can exist in productive harmony. Section 102 requires federal agencies to incorporate environmental considerations in their planning and decision-making through a systematic interdisciplinary approach (4). An Environmental Impact Statement (EIS) is a document which is required by the National Environmental Policy Act (NEPA) for federal government agency actions, such as highway transportation projects that "significantly affecting the quality of the human environment" (5). An EIS describes the positive and negative environmental effects of an agency’s action or project, and describes possible alternatives and mitigation measure to counteract unavoidable negative impacts. An Environmental Assessment (EA) determines whether or not an EIS is needed. If a project does not require an EIS, then an Environmental Report is provided.

2. The Wisconsin Environmental Policy Act (WEPA)

The Wisconsin Environmental Policy Act (WEPA) is a state law designed to encourage decision making by state agencies to consider environmental impacts. WEPA, signed into law in 1972, details Wisconsin's environmental policy and requires that WisDOT and other state agencies consider the environmental effects of their actions “to the extent possible” under their other statutory authorities. It also commits to the standard that extensive citizen participation should be part of environmental decision-making. WEPA establishes procedures and requires environmental analysis by Wisconsin agencies. It does not provide authority to protect the environment. While this law does not apply to local government decisions, local projects involving state financial assistance or regulatory oversight are affected by it (6).

WEPA requires that WisDOT and other state agencies develop an inventory of environmental resources, and to take these resources into consideration in their decision-making process. In order to avoid negative effects to the best of their ability, agencies must consider possible alternatives to the particular project or action proposed. If the action is a "major action significantly affecting the quality of the human environment," the law requires agencies to consult

with other agencies about possible environmental impacts, prepare and circulate an Environmental Impact Statement (EIS), and hold a public hearing (6).

According to the National Environmental Policy Act (NEPA), “commitments often are made to the public and to federal and state agencies during the planning phases of a project. Commitments can also be made as a condition of permits or implemented to address resource agencies’ comments and requirements. It is essential that these commitments be carried through the design, construction, and maintenance phases of a project” (7).This research project is designed to assure and assist follow through on the maintenance and monitoring phases of such projects.

III. What is Mitigation?

According to the Council on Environmental Quality, Sec. 1508.20, mitigation is defined and structured as follows:

"Mitigation" includes:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action.

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

(e) Compensating for the impact by replacing or providing substitute resources or environments (8).

Commonly understood by transportation planners, decision making should be made in such a way that utilizes a three step process: first, negative impacts should be avoided if possible, secondly, if a sensitive resource cannot be avoided, the second step is to minimize negative affects which cannot be avoided. The third step is to mitigate negative impacts through creative compensatory solutions if avoidance and minimization options cannot be chosen (7). The environmental commitments discussed in this report were involved with transportation projects that could not avoid negative impacts upon the environment therefore required mitigation in some form.

IV. The Value of Tracking Environmental Commitments to the WisDOT

A. Monitoring

A number of reasons exist for why WisDOT ought to consider tracking environmental commitments that need ongoing maintenance and monitoring. Tracking environmental features allows for appropriate follow through of commitments. Monitoring can help identify if a mitigation feature is serving its intended purpose. Development of a tracking tool to assist WisDOT staff in managing this information regarding which commitments exist, where they are located, and what maintenance and monitoring is needed is an important step in achieving maintenance and monitoring goals. The tracking tool will allow for that information to be easily organized and accessible.

1. Design

Tracking results of monitoring can provide information to environmental coordinators, project managers, and other Wisconsin agencies as to the effectiveness of the environmental commitment project design. That information can be used to determine if spending funds on such commitments is efficient and worthwhile, or provide insight which may lead to changes in design of similar commitments that may need to be constructed in the future.

Tracking individual environmental commitments allows for a specific monitoring program to be designed for each commitment as needed. For example, ecopassages are specific culverts or other structural features that allow for habitat continuity by allowing small animals to pass under a highway in order to reach their preferred habitat. A way to monitor this passage to detect and determine usage could be to smooth sand, snow, or mud on either side of the passage. The smooth surface could be checked for animal tracks every day for a series of days, in order to identify which animals were using the passage, and how frequently.

Furthermore, monitoring can identify unintended consequences of features. In one particular case on State Highway 49, an ecopassage was being used by a variety of small animals. Duckling and gosling were attempting to use the pass, and minks would prey on them in the tunnels. By monitoring such features, adaptations can be developed to protect the preyed-upon wildlife. For example, grasses can be planted near ecopassage exits and entrances so that the animals using the passage are provided cover when exiting and entering the tunnels (9).

2. Cost Savings and Financial Efficiency

Tracking environmental commitments for the purpose of monitoring can allow for timely decisions and actions which can save on costs. For example, in various regions of Wisconsin, invasive species are quick to establish themselves in disturbed areas. Right of way that was part of a transportation project can be especially vulnerable to these invasive species. Where appropriate, WisDOT prefers to plant highway right of way with native seeds and plants that require minimal upkeep and maintenance that may also provide pleasant view-scapes for drivers and habitat for wildlife. These areas need to be monitored to verify if the native plantings and seeds survive and thrive. They need to be monitored for growth of invasive species such as Phragmites, Purple Loosestrife and Crown Vetch. If the invasive species are “headed off” before they are allowed to spread their seeds or roots, they are less costly and timing consuming to remove.

Another reason to monitor these commitments is to improve financial efficiency and to aid decision making in the transportation processes. Public funds are devoted to the planning, design, and construction of such features, allowing them to fail due to a lack of maintenance and monitoring results in inefficient use of public funds.

B. Maintenance

1. Lifespan of features

Considering the original intent, time, and funds that go into environmental commitments in the design process in order to mitigate a negative environmental impact, it is logical to have such commitments to continue in functionality. Maintenance of such features is a necessary and logical step to protecting and preserving the environment by committing to the ongoing functionality of such features.

Tracking environmental commitments is important in order to provide timely and appropriate maintenance of features. Certain features will only fulfill their intended ecological purpose if properly maintained. Tracking for the purpose of environmental commitment maintenance allows those responsible for maintenance to know what commitments exist in each region, where they are located, and how and when they are best maintained. Use of the tracking tool developed for this purpose will also help to provide information as to what is taking place on a state-wide level. It is recommended that a yearly report of commitments being tracked be submitted to the WisDOT central office. Once this information is compiled, it will provide an overview of the maintenance and monitoring needs on a statewide level. This may help in planning for maintenance activities. For maintenance such as mowing, cleaning out of culverts, and fixing of wildlife fences, efforts to maintain different commitments need to be coordinated in order to minimize maintenance costs.

2. Fulfillment of Contract Items

Tracking also creates the opportunity to assure all contracted work is completed. For example, contractors are commonly paid to place silt fences on slopes to avoid erosion that may take place due to disturbed soils and slopes during construction. Silt fences are commonly made of fiber or wire coated in plastic. Once soils and slopes are stabilized the fences need to be removed. The removal of silt fences is commonly included in contracts and paid for upon completion of the construction project by a contractor. Silt fences are often left for the winter in order to allow for soil stabilization, due to work completed late in the fall season. The Wisconsin DNR has reported that an estimated 30-40% of the time, a contractor does not return the following season to remove the silt fences after the soils have stabilized.

Tracking silt fences provides an important benefit to wildlife: small animals often get caught and stuck in silt fences. The plastic fencing entangles these small animals, causing injury or death. Tracking can serve several purposes in regard to this type of scenario. First, it can identify the location of silt fences. Secondly, it can assure the fences are removed. Thirdly, tracking serves a cost-saving purpose; if silt fences were not removed as required per the contract, the contractor can be contacted to complete the work as listed in the contract. It may also be considered that the contracting practice be changed so that the contractor is not paid for the removal of silt fences. This would require WisDOT maintenance staff be responsible for that activity as noted, they are already doing so on 30-40% of the late season projects. Tracking to assure timely removal of the silt fences after soils have stabilized has both a fiscal and environmental rationale.

C. Accessibility

Tracking of environmental commitments provides a useful resource for current staff. The program would allow for easy access to important information. It would be "at the staff's fingertips" in one accessible location. Today, staff needs to peruse inter-agency or interdepartmental emails, hard-copy documents including inter-agency letters, Environmental Impact Statements (EIS), as-built design documents to locate environmental commitments. Currently, no tracking mechanism exists for environmental commitments that need ongoing maintenance and monitoring. Without a tracking system, maintenance and monitoring of commitments has been prohibitively difficult for staff. The tracking tool is essential in order to have appropriate maintenance and monitoring take place. It will allow staff to identify what commitments exist, where they are located, and what maintenance or monitoring needs to be done. Accessibility of such information is the first step to developing a complete maintenance and monitoring program.

D. Continuity

As common with all employers, WisDOT experiences staff changes. When staff leaves or change positions they take with them substantial levels of "institutional information." It would serve WisDOT to have information collected by past employees accessible to staff who replace them or their responsibilities. A tracking tool used for environmental commitments will serve that purpose. A new employee, who is unfamiliar with past projects and commitments, can easily identify what commitments have been made, their location, and maintenance and monitoring needs and history. The tracking tool as a centralized resource for ongoing environmental commitments allows for information to transfer simply during staff changes. As much as the loss of a good employee to retirement or to a position change may present challenges, being able to retain data and institutional knowledge is very valuable to the continuing efforts in environmental management.

E. Communication

Another advantage of tracking environmental commitments is the ability to improve communication between WisDOT and County Highway Department maintenance crews and other organizations regarding certain activities such as mowing, invasive species management, special areas of environmental significance or sensitivity that shouldn't be mowed or should be avoided during plowing.

Tracking can improve internal communication within WisDOT among regions and staff at the central office. The tracking tool is designed so that information about commitments is easy to share. WisDOT staff may be able to identify trends in types of commitments being made across the state. Tracking creates opportunities for staff to identify common commitments, develop standards and protocol, or possibly address similar challenges or maintenance issues with statewide maintenance contracts. Through information sharing, maintenance or monitoring efforts might be addressed on a larger scale for efficiency.

V. Current Wisconsin Practice and Commitments

Wisconsin has a diverse geographical and ecological landscape. Wisconsin is uneven in its urbanization patterns, featuring rural, forested, and developed areas. Each of the five WisDOT Regions require varying types of environmental commitments based on types of land use, environmentally sensitive areas, wildlife populations, demographics, and levels of urbanism.

A. Priority Features

The features that have been identified in interviews and other forms of research which are most reoccurring, and may value greatly from being tracked include:

- Wildlife barriers and passages
- Silt fences (removal)
- Habitat management including invasive species management and native species support.
- Wetland on-site mitigation sites
- New storm water management tools such as bio-filters and infiltration trenches
- Stream relocations
- Tracking of cultural and historical sign installation and maintenance

Despite significant research into cultural resource commitments, there are limited ongoing commitments as avoidance is the first choice whenever possible.

Figure 1 lists categories and environmental commitment features identified by WisDOT staff and WDNR staff as priority features to track which need ongoing maintenance and monitoring after completion of transportation projects.

Environmental Commitments for Future Tracking	
Feature Category	**Feature Type**
Cultural Resources	
Archaeological and Historical Resources	Tribal Lands and Seated Territories
	Historical and Cultural Signage and Displays
	Historical Landscape and Viewshed Maintenance
Environmental Justice	
	Communications with the General Public: Notices, Newsletters, Project Updates
Natural Environment	
Wetlands	On-site Mitigation Banks
Streams and Floodplains	Relocated Streams
Upland Habitat	Re-establishment of Habitat: Seeding and Planting
	Translocation of threatened and endangered species
	Invasive Species Management
	Acquisition of Habitat Parcels
	Lupine Preservation: Karner Blue Butterfly Habitat
Erosion Control	
	Erosion Control Silt Fence Removal
	Special Plantings for Soil Stabilization
Storm water management	
	Bio Filters
	Drop Inlet Structures
	Infiltration Trenches
	Follow up on Street Cleaning and Catching Agreements
Physical Environment	
Air Quality	Air Quality Monitoring Stations
Traffic Noise	Noise Walls
Wildlife Accommodation	
	Habitat and Nesting supplementation
Aquatic Species	Perched Culverts
	Wet Culverts with "resting spots" for spawning fish
Crossings	Ecopassages: Culverts, Day Lit culverts, Critter Passes, Extended Bridges
	Modified Bridge Underpasses
	Timber Wolf Crossing
Walls	Walls/Turn-arounds
Signs	Deer Crossing Signage
	Radar-Collar Warning devices for Elk encroachment
Delayed Projects	Road Relocation Agreements
	Culvert Relocation or Resetting
Other	Road Core Removal
	Post Construction Debris Clean-up

Figure 1 Recommended Features for Tracking

B. Inventory of Commitments Made in the last 15 years on Wisconsin Transportation Projects.

The research team conducted interviews with WisDOT staff, Wisconsin DNR staff, scanned environmental documents, and reviewed inter-agencies letters and Memorandums of Understanding (MOU) in order to identify environmental commitments made since approximately 1995 that require ongoing maintenance and monitoring to be fully functional. The interviews and research revealed which types of commitments are most common, which may be take priority in tracking, and those which may be considered for future tracking. Examples of environmental commitments recorded in the inventory and recommended for tracking are described Figure 1 and in the following section.

C. Wisconsin's Environmental Commitments

1. Cultural Resources

The preservation and protection of Wisconsin's Cultural and Historical resources is a priority that is embodied in the transportation planning processes of WisDOT. In 1966, the National Historic Preservation Act (NHPA) stated:

"*The Congress finds and declares that...the spirit and direction of the Nation are founded upon and reflected in its historic heritage; historic properties significant to the Nation's heritage are being lost or substantially altered, often inadvertently, with increasing frequency; the preservation of this irreplaceable heritage is in the public interest...*" (10).

In 1966, Section 106 was established as part of the NHPA. The Section "requires Federal agencies to take into account the effects of their undertakings on historic properties and must afford the Advisory Council on Historic Preservation an opportunity to comment" (11). The Section 106 review process is designed to guarantee that historic properties are taken into consideration during Federal project planning and implementation. An independent Federal agency, the Advisory Council on Historic Preservation, oversees the review process, with support from State Historic Preservation Offices (SHPO).

Section 106 review was created **"**due to public concern that our nation's historic resources were being destroyed during federally sponsored projects. Prior to passage of NHPA, the Federal preservation laws applied only to a handful of nationally significant properties" (11). Now it is planners' responsibility to "make a good faith effort to avoid, minimize or mitigate adverse effects" (12).

When an Environmental Impact Statement (EIS) or an Environmental Assessment (EA) is conducted, the Wisconsin (SHPO) needs to be contacted regarding the project. The reason for this contact and coordination is to "identify historic and archaeological resources, determine effects, and to consider appropriate mitigation measures where necessary." Specific requirements need to be met in regards to historic and archaeological preservation as described below:

1. Both the National and Wisconsin Environmental Policy Acts require an analysis and documentation of potential environmental impacts of proposed projects. Results of coordination with the SHPO are to be included in both draft and final environmental documents.

2. For federal aid projects, Section 106 of the National Historic Preservation Act of 1966, along with implementing procedures developed by the Advisory Council on Historic Preservation (ACHP), affords special protection to properties on or eligible to be on the National Register of Historic Places. The ACHP procedures require that cultural resource

identification, analysis, impact determination, and report preparation be done in consultation with the SHPO. In Wisconsin, the SHPO is the Administrator of the Historic Preservation Division of the State Historical Society.

3. Section 4(f) of the 1968 Federal Aid Highway Act requires that special consideration be given to certain park lands and conservation areas as well as to National Register or Register eligible historic sites. To make "use" of such lands for highway purposes with federal funds, Section 4(f) approval must be obtained from the Federal Highway Administration (FHWA) (12).

Environmental commitments that have been made in the arena of cultural resources fall into several categories. These include:

- Tribal and archeological
- Roadway signs marking points of historical and cultural significance and archeological affects.
- Environmental justice and public participation projects
- Historical landscape and view-shed maintenance or restoration

a) Archeological affects/Native American Lands

Post-construction environmental commitments often include interpretive displays for history and archeology. Commitments include the creation of archeological reports, maps for an historic district, and museum or wayside displays (13).

Exhibits have also been created as public education tools about cultural or historical information. For example, there was a traditional cultural property of the Menominee Tribe that was going to be affected by the roadway, although it would not affect any significant sites. In order to mitigate the affect, a display was made regarding the importance of Sturgeon to the Menominee Tribe, which circulated through different public display locations, and is currently in possession of the tribe (14). Such displays need to be stored and maintained for future use. It may be beneficial to create a plan for who will fulfill these responsibilities and what maintenance of the display may be needed. This information will be able to be tracked using the new tool.

Also, numerous signs and informational kiosks have been posted along Wisconsin roadways, describing nearby cultural and historical features or events that took place in the surrounding area. These features would benefit from tracking in order to maintain quality and functionality of such signs and kiosks (15).

b) Environmental Justice and Public Participation

In the area of environmental justice and public participation, at times there are promises made to include the public on some level after a project has been completed. Commitments may include communications producing information about a project, or related environmental or social impacts of the project.

c) Historical Landscape and Viewshed

Some transportation projects also have commitments made due to negative impacts on an historical area. WisDOT environmental coordinators identified numerous commitments which they see a value in tracking. These include landscape restoration and plantings designed to mimic that of a particular historical period which complements the historical feature affected. For example, a highway project took place near the John Coomb Historical Landmark in Richland County. In order to mitigate negative impacts of the roadwork, the surrounding landscape affected by the project was designed to replicate the historical appearance of 150 years ago (16).

WisDOT needed to replace a box culvert on the roadway at this location. In order to meet view-shed requirements WisDOT hid the rip-rap, spread appropriate seed, and planted seedling to restore the site to the landscape of the 1800's. These historically appropriate plantings may need to be monitored to verify plant survival. Some landscaped areas may also need particular maintenance such as mowing, burning, and removal of invasive species due to soil disturbance. These activities will be further discussed in later chapters.

d) Roadway Signs

Also, numerous signs and informational kiosks have been posted along Wisconsin roadways, describing nearby cultural and historical features or events that took place in the surrounding area. These features would benefit from tracking in order to maintain quality and functionality of such signs and kiosks (15).

Figure 2 New Turtle Wall, Source: Bob Swartz, WisDOT

2. Wildlife Accommodation

Research regarding wildlife accommodation commitments show that there are a significant number of such commitments that need ongoing maintenance and monitoring to continue functioning properly. Staff from WisDOT and WDNR identified certain types of commitments that would benefit from ongoing monitoring and maintenance, such as wildlife barriers, "ecopassages"-wet and dry culverts designed for wildlife crossing and habitat connectivity, "critter passes," perched culverts, and modified banks under bridges.

As discussed by Better Roads Magazine, ecopassages and critter crossings are essential as their purpose is founded on endangerment of humans and wildlife in animal-automobile crashes. Better Roads notes that "Analysis of the 2003 nationwide highway crashes and fatalities data shows that wildlife-vehicle crash human fatalities increased 45% from 1994 to 2003. Out of an overall 6.3-million crashes resulting in 2.9-million injuries and 42,884 fatalities, 315,000 crashes (5% of total) involved wildlife and vehicles. The result was 10,000 injuries (1% of the total) and 200 fatalities (0.5 % of the total)" (17).

Better Roads also acknowledges that game animals "like elk, deer, moose, and even bears get the bulk of the publicity. But millions of non-game animals such as raccoons, foxes, birds, reptiles, and amphibians — and domestic pets like cats and dogs — are killed on America's streets, roads, and highways every week" (17).

Figure 3 Blanding's Turtle Photo Credit: A. Sheldon

Despite the best efforts of planners, designers, and engineers to avoid and minimize impacts of transportation projects on the environment, they still have detrimental effects on local ecology. "Highways impact wildlife negatively through habitat fragmentation, on-pavement wildlife mortality, loss of habitat, displacement of wildlife as they avoid the pavement, and associated human activities" (17). Due to these impacts, it is essential that the mitigations activities successfully fulfill the ecological function for which they are intended.

a) Walls/Barriers

In Wisconsin, the Department of Transportation uses wildlife barriers such as walls and fences as safety features on roadways to prevent auto-wildlife collisions and protect threatened and endangered species. These features are especially prevalent in the southern portion of Wisconsin where populations of threatened and endangered species such as Blanding Turtles and Butler Gardner Snakes have extensive habitat which has at times been divided or approached by roadways.

Figure 4 Butler's Gardner Snake.
Photo Credit: M. Redmer

Barriers are designed to prevent wildlife mortality on roadways by preventing wildlife from crossing a roadway or by guiding wildlife to an ecopassage (Figure 5). The Blanding's Turtle, a Wisconsin threatened species, is naturally determined to reach the habitat of its choice. It will climb very steep banks and attempt to cross dangerous roadways to reach the desired location. Therefore, even when roadways have steep banks which are challenging for turtles to crawl a fence or wall is still necessary in order to prevent mortality (9). A wooden wall or metal fence is chosen in the planning and design process due to combined decision-making of WisDOT and WDNR staff. The commitment is established in accordance with inter-agency agreements, and often detailed in inter-agency letters. Figure 6 depicts a fencing designed to redirect snakes or turtles from particular unsafe areas, during or after construction. These fences commonly funnel the wildlife towards an ecopassage.

Over time, these features will need to be maintained. For example, on a highway project there was short fencing put up to prevent turtles from crossing a highway. The first year this was effective, but in following years the grass grew up and fell over the fences creating a "turtle ramp" and allowing the turtles to access the highway again. This resulted in turtle loss (16, 18). These areas need to be mowed at appropriate times in order to extend the functionality of the barriers beyond the original season of construction.

Another concern with walls and fences is that they can become damaged over time. Fallen tree limbs from nearby trees have damaged fences (18). If a car goes off the roadway it can easily damage or destroy parts of a fence (16). For example, there is turtle fencing on U.S. highway 10 East and West between Stevens Point and Waupaca. Where fences have grass grown over them and have been hit by cars. Soon WisDOT will be putting up right of way fencing, which 3 feet by 3 feet square wire, with a hardware cloth at the bottom that will be flush with wing walls and culverts to prevent small animal passage (19). This design should be more lasting and effective than the shorter, easily damaged wooden walls.

Recommendations for monitoring and maintenance of wildlife crossings and barriers have been suggested by numerous agencies.

The commitments may be monitored best in spring after snow thaw; at that point they can be assessed for damage (20). Monitoring and maintenance can be

Figure 5 Installation of Ecopassage
Photo Credit: Gary Birch, WisDOT

verified and documented in the tracking tool to confirm working condition and follow through on repairs.

A mid-summer mowing plan timed with mating movements of the turtles and grass growth could also be developed. It may be useful to develop a mowing plan for any fenced area in accordance with types of grass and other right of way features in the area. One challenge is identifying funding as County Highway Departments need WisDOT to fund mowing and maintenance of these features.

Maintenance and monitoring recommendations for walls and barriers include using "impenetrable materials including galvanized tin, aluminum flashing, plastic, vinyl, concrete, or a very fine mesh. Some small species such as snakes and frogs have been observed climbing vegetation along funneling mechanisms. Monitoring and removal of vegetation along fences is suggested to ensure passage through the structure" (21).

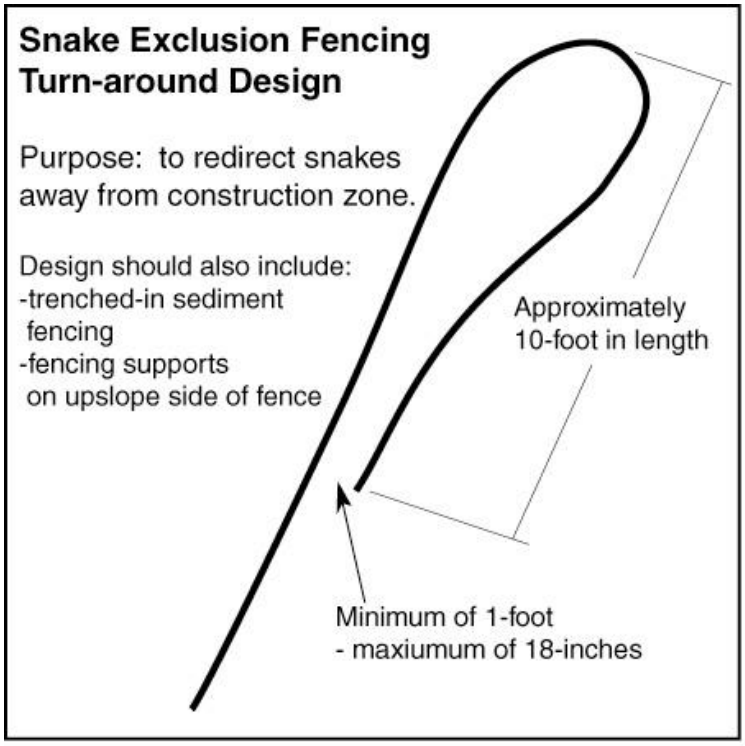


Figure 6 Turtle Turn-Around Design
Source: WisDOT

b) Ecopassages

Ecopassages are defined as a series of guide-walls and under-highway tunnels that allow wildlife to safely cross roadways (22). Ecopassage tunnels take on several forms including wet and dry culverts, extended bridges and converted riparian areas alongside streams and creeks which pass under bridges.

Figure 7 Installation of Ecopassage
Photo Credit: Gary Birch, WisDOT

There are a number of these passages on Wisconsin roadways including State highway 164 and on State highway 36 of the new alignment of the Burlington Bypass. Many of these ecopassages are designed for the Butler's Gardner Snake, and Blanding's Turtle which are Wisconsin threatened species. State highway 59 also has a number of small passages for the Butler's Gardner Snake.

Daylighting and the length of crossing are both important in designing ecopassages. If the passages are too dark or too long, the wildlife may not enter the passages. Snakes need to have a high level of motivation to change their environment in order to enter the small dark tunnels. A barrier may be needed in order to funnel wildlife to the passages as discussed in the previous section (9).

In Figures 7 and 8, ecopassages with daylighting features in the design are being installed on Wisconsin highway 36. This design includes funnel fencing to the entrances and requires grates of some sort to be installed at the median of the roadway above the passage, so that light filters into the passage. These grates need to be checked for debris or blockages that may prevent light passage.

Figure 8 Ecopassage in Northern Wisconsin
Photo Credit: Gary Birch, WisDOT

Ecopassages may need to be monitored and maintained for several reasons including to observe how they are being used, which animals are using the passages, and if their intended ecological function is being fulfilled.

Staff need to discover whether or not the wildlife for which the crossing is designed are comfortable using the structure and are able to safely use the crossing without being victimized by predators who have identified the crossing as a convenient source of prey. For example, a problem that was encountered with ecopassage dry culverts on State highway 49 was that minks were using a culvert passage as a "foul café." Duckling and gosling were attempting to use the pass and minks would prey on them in the tunnels. Other culverts have been found full of rattle snakes, dirt, debris and even a black bear. Therefore, monitoring for appropriate usage, and adjusting future designs based on findings, can be a significant value of monitoring (18). The information acquired in monitoring should be recorded in the tracking tool as described in the User's Guide.

Another design feature that may need monitoring are grasses planted such as prairie grass for immediate cover at passage ends. Grasses can provide cover from predators and make the wildlife less likely to be viewed when entering and exiting the tunnel. According to one study "vegetation surrounding the approach to the structure is an important consideration when designing for multiple species. While some level of natural vegetation is important to maintain habitat continuity, the type of vegetation can play an important role in culvert use. Most small mammals, amphibians, and reptiles prefer low stature cover in the form of vegetation, rocks, and logs to protect them from predators. Medium and large mammals that are prey species (rabbits, deer) may be wary of using structures with

extensive vegetation where predators can hide. Eliminating potential predator ambush opportunities, while providing good visibility for medium and large mammal prey species, will encourage use of a culvert" (15).

Recommendations include monitoring beginning one or two years after installation, as wildlife are often very adapted to their normal crossings and are rather suspicious of any changes to their environment (9). Usually there is a lot of expertise at the table during design process- but monitoring will demonstrate levels of effectiveness (9). On the Burlington bypass's new alignment there will be a monitoring contract to observe usage and to improve design on future projects.

Maintenance on crossings is needed because every three to five years the crossings are overgrown or have become non-functional. For example, culverts get clogged, or fences fall down (18). The maintenance problem could be solved easily with good tracking and a commitment to maintenance but there is no funding for monitoring at this point, and no monitoring system established (18). Considering the current state of the economy, new funding is not likely to be dedicated. Mowing has not been taking place on most highway roadsides recently. Spraying for thistles and other invasive species has been eliminated due to budget restrictions (18).

Currently there is no funding in WisDOT maintenance budget for repair or unclogging of culverts. When funding becomes available WisDOT needs to determine who is responsible for which type of maintenance- WisDOT, the County Highway Department, other agencies or non-profits. Usually, maintenance is taken care of by the County Highway Department for mowing and other highway maintenance services. However, the County needs to be paid for those services. Problems regarding maintenance lie in the funding structure for projects. Once "the lines are painted and seed thrown out" project funding ends and maintenance is passed on to the County Highway Departments (18). Counties will follow up on that maintenance but they will need a way of having information about environmentally sensitive areas that need special care, or about specific needs, such as mowing on both sides of turtle fencing at particular times of the year.

Monitoring has a value as it can help to indentify the effectiveness of crossing structures. Midwest states have a challenge due to their rolling landscape (18). In Florida and California, for example, crossings are in distinct places due to the distinct variation in landscape. In the rolling flatlands of Wisconsin animals can cross anywhere. Pinpointing movement is very challenging in order to create crossings that are used and are effective. Monitoring can tell us which creatures are using the ecopassages and if they are using crossing according to design intentions. For simple low-cost monitoring, dirt, sand, or snow can be leveled in front of the pass. Tracks can be checked after a few days to indicate usage. Ongoing maintenance of these structures to clear debris and maintain openness is essential (15).

Recommendations and strategies for maintaining and monitoring culverts which are intended as ecopassages to ensure continued effectiveness of the culvert and use by fish and wildlife include:

- Installation of traffic control measures (animal crossing signs).
- Monitor structures to ensure they are clear of obstructions such as detritus or silt blockages that impede movement.
- Monitor fencing to minimize duration of any breaches that may compromise wildlife connectivity.
- Monitor and evaluate effectiveness of culvert as a fish and wildlife crossing and make appropriate adjustments if necessary (e.g. Retrofit fencing or other modifications), and coordinate and report findings to fish and wildlife management agencies.
- Evaluate culvert impacts on erosion, and riparian areas to ensure habitat integrity (15).

c) Critter Passages

Another type of ecopassage is a structure commonly referred to as a "critter pass." These were used on State highway 131 in the Kickapoo Valley Reserve. "Critter passes" are breaks in the barrier wall on a roadway that allow animals such as Wood Ducks to cross the road. Wood Ducks are known to nest in the uplands and lowlands and therefore are likely to pass from the bluffs to the lowlands past the roadway. The level of use of these passes is unknown. Monitoring could indicate if the passes are used, and whether or not they are a valuable ecological and financial investment.

Figure 9 Ecopassage on State highway 36
Photo Credit: Gary Birch, WisDOT

d) Perched Culverts and Stream Modifications

A perched culvert is defined as a culvert that has an outlet elevated above the downstream waterway, causing a small waterfall condition. This is also called a hanging or shotgun outlet. A perched culvert requires migrating fish to jump up into the culvert from the downstream waterway. The height that the fish has to leap can be prohibitive as flow changes or if erosion near the culvert occurs. According to federal agencies, perched culverts often result from the erosion that occurs at the outlet of an undersized culvert as water exiting the culvert at high velocities has a high erosive potential that results in downstream scour of the channel bed and banks (24).

Perched culverts were identified as an important mitigation commitment that may need maintenance and monitoring post- construction. Trout cannot get into these perched culverts when they go upstream. For example, where stream culverts were installed improperly and needed to be fixed to allow for spawning, the culverts now have insertions in them which are shaped like an "s" which create "rest stops" so the fish can get in, and make it the distance when water is flowing too fast in the culvert. These need to be checked to see if they wash out (19). Also, there is a fish crossing on State highway 63 in Bayfield County which may need similar monitoring (18). Usually just one WisDOT staff member is knowledgeable about these features, which is a concern if that person were to leave. No-one would know how to appropriately maintain and monitor the sites. In order to have staff throughout the state that knows how to care for these features, they need to be trained on how to maintain and monitor these commitments. A tracking system would be helpful in passing on the knowledge of proper maintenance and monitoring for these features (18).

Some culverts include stream simulation: rocks and stones are placed in the flow line of the culvert, and they are set below the adjacent stream bed. These are mostly found in the northern part of Wisconsin. These may also benefit from monitoring to verify they are maintaining the stream simulation effect (19).

e) Modified Banks

Typically for stream banks large boulders are placed all the way down to the stream bed during construction. A new practice is to lay moss, stone or large gravel of some sort on the banks in order to provide passage under bridges for small animals and turtles. Typically, rip-rap would also be placed down to the shoreline. Current practice is to create a level area for animals to pass without having to traverse the rip-rap. Examples of these efforts can be found along

the Rib River by Wausau on U.S. highway 51, under a series of four different bridges. They are also under a number of smaller bridges such as State highway 23 in Montello near County Road M and near Hawks Creek in Marquette County. These critter passes need monitoring to determine whether or not they will be needing maintenance in the future (19). Monitoring could indicate how well the gravel or stone banks are holding up. This can depend on the flow of the river. If it rises over the passes it may wash the modified banks away.

f) Warning Signage

Figure 11 Elk Crossing Warning Sign
Photo Credit: Gary Birch, WisDOT

There are various types of warning signs to alert drivers to wildlife which may appear on or near the roadway. The most common type of warning signage is deer crossing signs. A new and unique program for alerting drivers to elk crossing is being tried in northern Wisconsin. The elk crossing/radio collar program was piloted in 2007. Radio collars were put on a number of elk in the herd. When elk approach the roadway, the collars send a signal to a sign near the roadway. When a nearby elk activates the sign lights flash to indicate to drivers that they should slow down and proceed with caution. The collared method is limited as it doesn't cover the entire herd, and if a collared animal dies, then its herd is left unprotected. The system needs significant maintenance to ensure that all of the parts are working. A major challenge with the system is that the photo-voltaic cells have to be brushed off when it snows. Back up batteries are within the cells, but they can run dry since the solar powered signs are not close to a WisDOT office. It is very time demanding to drive to the site weekly, which makes maintenance and monitoring of the device challenging (18).

Figure 10 Elk Crossing Warning Sign
Photo Credit: Gary Birch, WisDOT

g) Wolf Crossings

Timber Wolves are currently listed as a "State Protected Animal." Over the last few decades, they have been federally listed as threatened and endangered species (25). When Timber Wolves were re-entering Wisconsin in the 1990's, significant funds, in the range of four to five million dollars, were spent on the creation of specially designed highways to facilitate wolf crossings. Specialists explain that in order for wolves to repopulate other parts of Wisconsin they would move from northern part of state eastward. State highway 53 was to be built in an area known to be wolf habitat, and was seen as a potential barrier to this movement. In order to accommodate wolf movement across the new highway a specific design which separated traffic lanes was constructed. Development

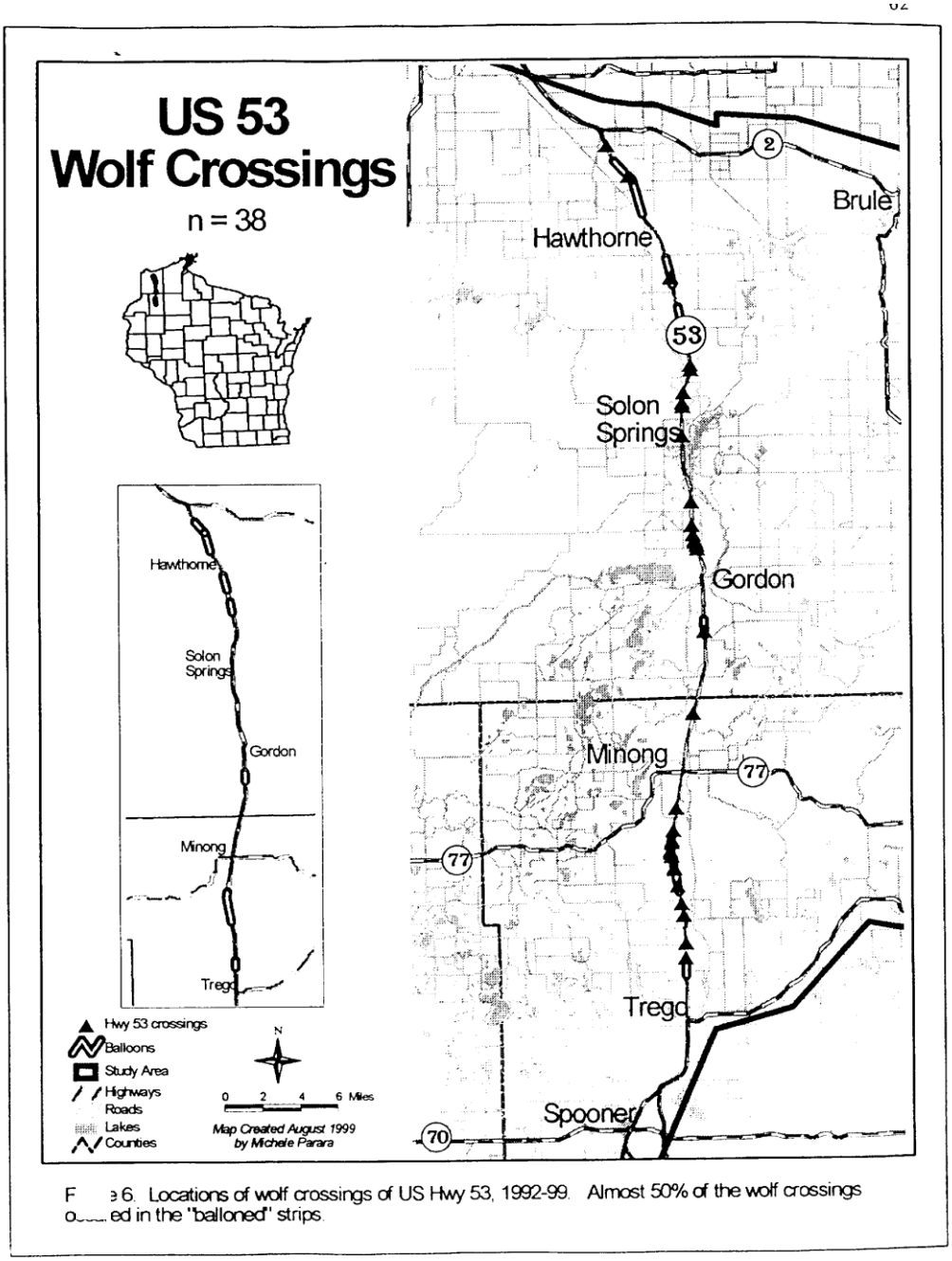
of this design went through a very formal process with the U.S. Fish and Wildlife Division and Wisconsin Stage agencies, as Timber Wolves were a federally endangered species.

Figure 12 Timber Wolves
Photo Credit: Kritter Korner

The WDNR did a study monitoring behavior of wolves crossing the highway. The study identified that typical length of open space in the median would be prohibitive to crossing. On a traditionally designed highway, wolves would need to look both ways before crossing, and then cross a total of four lanes of traffic which would be coming from two directions. The U.S. and Wisconsin agencies agreed this would likely cause wolf-car crashes and that another design should be considered to reduce potential for crashes and wolf mortality. The process resulted in a biological opinion that WisDOT could use a widened median if WisDOT tracked the number vehicle wolf kills to verify this design minimized the number of kills by collision. For the final design, the road was split so instead of opposing lanes traveling next to each other, one veered away to create an elliptical or "bubbled" shape roadway. This design allowed for significant amount of space between the lanes for wolves to take cover before passing the next lane. Due to this design, wolves would need to watch for traffic coming from only one direction at a time. Wolves would only have to go across two lanes at once so they would not have to look both directions nor be exposed at any point in time. The road crossings were located based on wolf habitat and estimated determination of where wolves were likely to cross the road most often. This design can be viewed in Figure 13.

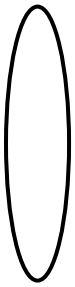
Today there are more than 600 wolves in Wisconsin (18). Over time, wolf behavior has begun changing; it seems the wolves had grown comfortable with traffic to a large degree, one of their dens was actually found between the two lanes.

In order to fulfill its commitment to track wolf killings, WisDOT has used radio telemetry to track wolves. Reports indicate that there have not been many kills and wolf behavior indicates that it is successful. However, the wolf population in Wisconsin is growing. Therefore, there could be an increase in killings due to a larger population (20). As new roadways are developed and planned near wolf habitat, WisDOT needs to take this wolf population into account. WisDOT staff needs to continue consideration of the wolf population in future design and projects. For example, a future project to convert a roadway in northern Wisconsin from at-grade to freeway may pose challenges to wolf crossing. This new project's current design would require new frontage roads and side roads. The problem with this project is that leading issue for Timber Wolves living in the area is road density. Increasing the amount of roads and the width of roadways poses additional challenges to wolves in crossing and increases the likeliness of wolf-car crashes. This project will increase that road density and its potential impact on the wolf populations should be considered. Additionally, WisDOT will need to continue careful tracking of Timber Wolf killings or collisions (20). Use of the tracking tool may be considered for tracking vehicle wolf collisions on current roadways, and to establish best practices for wolf crossings on future projects.



F e 6. Locations of wolf crossings of US Hwy 53, 1992-99. Almost 50% of the wolf crossings o ed in the "balloned" strips.

Figure 13 Timber Wolf Crossing
Source: WisDOT



This shape on the drawn map above indicates the elliptical shaped wolf crossing with split lanes.

h) Mussel Relocation

At times endangered mussel species are relocated when a transportation project takes place near a bridge. The mussels are moved due to a concern that project materials may enter the waterway and temporarily affect water habitat quality. Wisconsin agencies need to communicate about how much disturbance there will be and move the mussels to an appropriate location. A mortality check after moving the mussels is useful to understand the impact being moved has on the mussels. Examples of this type of activity took place on the Wolf River, and the St Croix River. On the St Croix River project WisDOT hired consultants to tag and move mussels, and later go back and check mussel survival rate. Hiring consultants for projects such as this is not common due to high costs.

3. Habitat, Native Plantings and Invasive Species Management

There are numerous transportation projects that affect wildlife habitat. Mitigation for these projects includes practices such as preserving and acquiring existing habitat or replanting habitat with native species near or along the roadway. Native plantings or native seedings are used in order to mimic the natural environment and minimize maintenance costs over time due to integration into the natural ecosystem. Such native plantings and seedings may need some maintenance to ensure survival. Monitoring is valuable as disturbed soils are vulnerable to invasive species. If invasive species are identified, a management program may be needed to eliminate the invasive plants and prevent further spread of the species.

a) Habit Preservation

Preservation of habitat is an important environmental consideration. Habitat preservation allows for protection of traditional Wisconsin vegetation and provides cover for Wisconsin's wildlife. WisDOT mitigation actions include acquisition of habitat to replace habitat that is affected by a transportation project, planting of new habitat and special maintenance required for habitat of threatened and endangered species such as the Karner Blue Butterfly.

Acquiring habitat is occasionally a mitigation strategy when habitat is affected. For example, on State highway 10 there is a new alignment that encroaches on Prairie Chick and Red Shoulder Hawk habitat. WisDOT is looking for a parcel that could replace that habitat, but they are having trouble finding one. Currently, no willing sellers exist, and WisDOT cannot use eminent domain for mitigation. One piece of real estate that is the best option available has numerous buildings on it, which lessens its habitat value. If the obligation cannot be fulfilled right away, it can be tracked so staff is aware of the need to fulfill the commitment as land becomes available (19).

Another mitigation activity that occurs due to transportation projects is threatened and endangered plant species translocation. A few transportation projects have taken place over the years where a threatened and endangered plant colony has been in the project area. That colony must be protected, so it is replanted in another area. There is a need for monitoring and there may also be a need to some maintenance for those colonies (20). An example of plant relocation occurring is during construction of the U.S. highway 53 expressway, which expanded from a two lane to a four lane roadway. The two new lanes going southbound went across a plant colony which was moved to another area. WisDOT staff can use the tracking tool to monitor the translocated population.

The tracking tool can provide a benefit to WisDOT and WDNR communication about maintenance activities which affect maintenance. For example, there is right of way along the interstate that has a large colony of Lupine. When WisDOT is doing maintenance and improvements, it needs to be sure staff are aware of the high quality Lupine which is habitat for Karner Blue Butterflies in order to minimize encroachment and protect that habitat. WisDOT does have a program for prioritizing maintenance of the Karner Blue Butterfly habitat; the tracking tool will assist such programs by identifying the locations of these sensitive areas that need special maintenance. For example, the County Highway Department needs to coordinate mowing plans to avoid disturbing the hatching; in late May the first hatch of Karner Blue takes place and the second hatch occurs in July. WisDOT Environmental Coordinators could annually send out a letter containing information from the tracking tool reports to the maintenance crews, to advise where there are special areas of concern and how to best manage these areas.

Figure 14 Karner Blue Butterfly
Photo Credit: Gary Birch

b) Monitoring to Protect Native Species and Manage Invasive Species

One of the most common habitat restoration processes is in or near transportation project right of ways. As roadways are developed and improved, native habitat is sometimes lost in the process and cannot be avoided. Sometimes parcels near the alignment are rehabilitated, other times the right of way is seeded with native seeds or planted with native species to re-establish habitat that was lost due to the transportation project.

Mitigation agreements made by WisDOT and WDNR at times include planting of certain native species which may need some active management which can be facilitated by use of the tracking tool. Monitoring of these renewed habitats is essential for several reasons; first, to verify seeding been done according to contracts, second, to check for plant survival and growth, and third, to monitor for intrusion of invasive species (19).

Figure 15 Purple Loosestrife
Source: Wisconsin DNR

Monitoring is needed in order to establish habitat and verify that seeding is conducted according to contracts. Seeding typically takes place on reconstruction projects where it is determined that a particular type of seed can survive the conditions (19). At times when native seeds are planted the mixes are adapted by adding grasses to regular WisDOT seed mixes (9). WisDOT attempts to use seeds that are adaptable, that suit the growing capacity of the area and that require as little maintenance as possible. The goal is to use the right seed mix to be sturdy and adaptable, including Bull-Rush or Sedge. WisDOT has planted numerous types of seeds and root stock and has tried to identify which species are most adaptable to disturbed sites (9). Through monitoring, WisDOT staff has become confident about what works on mitigation parcels.

Monitoring is also needed for the control of invasive species such as Phragmites and Purple Loosestrife (20). *Phragmites australis* is also known as the common reed, or reed grass. It is a large perennial grass found in wetlands

which has become copious in Wisconsin (26). *Lythrum salicaria*, known as Purple loosestrife "is a perennial herb 3-7 feet tall with a dense bushy growth of 1-50 stems." It was brought to the United States from Europe in the late 1800's and used a as a garden perennial, lauded for its beauty. Today, by law, "purple loosestrife is a nuisance species in Wisconsin. It is illegal to sell, distribute, or cultivate the plants or seeds" (27).

The WDNR is aware of certain situations that allow invasive species to come in and flourish. In an area where there is a significant level of invasive species, the WDNR will write up numerous commitments during construction in order to prevent the spread of the seeds. When the ground is opened and a disturbance is created which allows invasive species to flourish. Despite efforts to prevent the spread of invasive seeds during construction, WisDOT may consider monitoring these areas with disturbed soils after the construction is complete. The tracking tool can be used to record the locations of these projects and their conditions over time. It takes one to three years to know success rates of native plantings and levels of intrusion of invasive species (20).

Following seeding, which is expensive, it is necessary to follow up with the mowing or more invasive species will be found in the area. Timing of mowing is also important in order to control invasive species. Currently, there is no set plan or management system, it is ad hoc based on staff availability and funding, which makes it difficult to achieve desired standards (19). At times funding comes from dollars associated with transportation projects.

Current WisDOT practices for managing invasive species include:

- Herbicide treatments
- Prairie burnings (rare)
- Beetles

Figure 16 Phragmites
Source: Wisconsin DNR

WisDOT is resourceful in using creative and economical management practices (19). For example, WisDOT and WDNR use a type of beetle to control invasive plant populations such as Krapweed and Reed Canary Grass. This beetle eats the young plants of the invasive species. The beetles are retrieved from a UW Field Station. Sometimes the management plan is simply to have WisDOT staff use backpacks full of beetles that they spread by hand. At times management agreements are made with the WDNR but the WDNR cannot be responsible for all of the invasive species management along Wisconsin roadways. Use of the tracking tool to identify which type of management is being conducted in which locations may prove beneficial. Use of the tracking tool for invasive species management not only can provide specific information about affected areas and management needs, but may also provide insight as to the level of effectiveness of management techniques.

WisDOT has begun using a Geographical Information System (GIS) for tracking and recording wetland information. It might also be useful for monitoring Karner Blue Butterflies and other special habitat areas. A (GIS) database can show location of seedings and plantings. This information can be easily shared with County Highway Departments in the form of reports or maps illustrating these locations. This could be used for control of invasive species such as Purple Loosestrife.

4. Stormwater

Stormwater features have been designed into transportation projects as environmental commitments to mitigate the increase in impervious surface and effects on infiltration resulting from the new roadways. Physical structures are used such as bio-filters, drop inlet structures and detention ponds. Many of these structures need maintenance and monitoring after construction is complete in order to fulfill their intended purpose.

Bio filters are a relatively new technology with a finite lifespan. Tracking these features will assist WisDOT staff know when maintenance and replacement should occur and when the structure should be replaced. For example, a bio-filter is planned to be installed on a new roadway near Portage. The tracking tool should be used to monitor the functionality and maintenance needs of this structure in order to identify best practices for similar features in the future. Monitoring of these features can provide information about how well they function. One recommended monitoring practice is to check for standing water-especially after a storm which may indicate they are not fully functioning (20).

Drop inlet structures which strain out the solids from passing water may also need to be cleaned out. This is also true for storm water detention ponds. It is recommended to have a plan in place which is tracked with the tool, in order to clean the detention ponds and to verify cleanings take place at appropriate intervals. If they are not maintained, these storm water infiltration features do not function properly, which can lead to environmental problems. For specific recommendations, working with WisDOT and WDNR storm water specialists is recommended.

5. Erosion Control and Prevention

a) Silt Fences

Another environmental commitment that should be considered for tracking is the timely removal of silt fences. Tracking silt fence removal provides an important benefit to wildlife. Silt fences are used during transportation projects to stabilize soil, slopes and prevent erosion. Using best practices, silt fences are removed after the area is stabilized. The plastic fencing needs to be removed in a timely manner as it can entangle small animals, causing injury or death. However, these fences have often been left in the ground- some have been found up to five years after installation (20). A common reason fences are forgotten is due to construction work that takes place late in the season. An estimated 30-40% of the time on late-season projects, fences are set for winter and are not removed the following spring. It is usually in a contract to follow through with removal, but contractors “are long gone” by spring (20). If contractors do not remove the fencing, WisDOT maintenance staff need to take over that activity. WisDOT staff can use the tracking tool to identify the late season projects which use silt fences, which will allow for simple follow up in spring.

b) Special plantings for Erosion Control

Another environmental commitment for erosion control is the use of special plantings. There are certain scenarios where it is questionable whether or not the special plantings function as designed. For example, there are some bridge projects where special plantings have been placed near a river. If an area under the bridge gets flooded periodically, the plants may not survive nor serve their intended purpose (20). Also, certain plantings need less light and should be planted where bridge shadows limit available light. Both of these types of plantings may be tracked using the tracking tool to identify what level of success they have in survival and erosion control.

6. Stream relocations

Another mitigation activity that occurs with bridge and highway projects is stream relocation. At times a transportation project's favored alternative encroaches upon a stream, requiring stream channels to be realigned or relocated (20). WDNR staff are currently attempting to acquire information about past stream relocation projects to see if they have worked well, realigned, and stabilized. Currently there is not enough information to report on success levels; the tracking tool can be used to monitor these areas and provide feedback on stream conditions over time.

In planning stream relocations there are definite procedures and methodology. WisDOT and WDNR spend a lot of time in the planning process in order to realign streams to be as natural as possible. A few years of monitoring is recommended in order to identify whether or not the relocation is functioning as it should. For shorter, smaller changes, it might be sufficient to verify success within a year, compared to more elaborate projects which require several years to verify success. Indicators of a successful relocation are no erosion and boulders are still correctly placed. It needs to be identified if the stream is re-cutting its path. Tracking to provide this information may be beneficial to provide best practices for future stream relocation projects.

7. Wetlands

There are significant efforts in the State of Wisconsin to avoid wetland loss, and to mitigate and monitor wetland projects when avoidance cannot occur. Federal laws require numerous levels of reporting requirements for wetland loss and wetland redevelopment projects. Currently, WisDOT has an aging and outdated Wetland Mitigation Bank Accounting System (WMBAS) that was designed many years ago in Microsoft Access software for wetland tracking. There are also numerous spreadsheets and other forms used in order to track and report wetland loss and generation in the state. These include:

- Environmental Tracking Spreadsheet(Microsoft Excel)
- Wetland Bank Accounting Spreadsheets (Microsoft Excel)
- Environmental Project Status Forms (Microsoft Excel)

In addition to WMBAS, forms and spreadsheets, the North East Region has begun using GIS to track its wetland acreage. Additionally, there is an initiative by Robert Pearson of WisDOT's Bureau of Equity and Environmental Services (BEES) to input all regions wetland data into a centralized GIS application. This central GIS database could then be updated annually or by quarter as regions could share GIS layer files and reports with BEES. This will not only provide important information to those managing wetlands, but will also assist with annual filing requirement

with Federal agencies. Considering the scopes of wetland management activities and tracking requirements and since other tools are currently being developed to manage wetland tracking, wetland banks are not included in this project.

a) Delayed projects

From time to time, WisDOT has entered into formal written agreements regarding some future action. Use of the tracking tool will enable staff to more readily be aware of and follow through with long term agreements regarding delayed projects. For example, when U.S. highway 53 was to be converted from two to four lanes; the existing two lane road went through a wetland that connected to a lake, separating the wetland from the lake. The Wisconsin DNR requested that WisDOT move all four lanes to the east, not just the two new lanes which would be east of the wetland. However, WisDOT wanted get additional life out of the existing pavement. As a solution, the Wisconsin DNR and WisDOT made an agreement that when the existing two lane pavement reached the point that it needed resurfacing, they would move the lanes over, or the lanes would be moved by 2010- whichever came first (20). This agreement was created to allow for efficiency in funding and timing, to include the environmental action as part of a larger project in the future. Recently, Wisconsin DNR staff received information from WisDOT about an upcoming resurfacing project regarding this portion of U.S. highway 53. Current WisDOT staff did not know the agreement regarding moving the lanes existed. These important details and timing of commitments can be tracked using the new tracking tool. Use of the tracking tool would avoid planning challenges such as this example.

8. Old Road Cores

There are situations where sections of road get realigned and commitments exist to remove old road cores and restore natural grades and contours. At times this requirement is not followed through on appropriately by contractors. Sometimes they only take the blacktop off and consider that adequate, but contractors are responsible to restore original and natural contours. These old road cores should be removed during the project, however, if they are not appropriately removed it is necessary to find a way to do so after the project is completed. However, after the project is over and these areas are no longer WisDOT property right of way, then the WDNR has to work with the new landowners on this issue. Therefore, it is best to take care of the restoration before the property changes hands.

9. Post Construction Debris Clean Up

Additionally, it is important to plan for debris clean up at the end of construction projects. This is especially needed near rivers and streams, as often construction debris falls into the waterways. Some contractors leave litter from lunches, personal items, and construction materials including Styrofoam, rebar, fabric, lumber, banding wire, as these materials have been found in the waterways instead of being collected and removed. It might be that some firms or employees lack an environmental ethic and that it is necessary to actively encourage contractors to not littler and to not allow construction materials to end up in waterways. In the course of debris clean up it is suggested to look downstream and remove litter if it that was not caught immediately.

VI. Additional Features to Consider Tracking in the Future

1. Cultural Resources

One particular feature that WisDOT may consider tracking is tribal interest and how WisDOT actions may potentially affect certain resources such as wild rice. In Michigan, Minnesota and Wisconsin tribes have taken states to court asserting that they have particular rights according to treaties. These treaties precipitated tribal spearing, rights to harvest deer, water fowl, forest products, and wild rice (20). Tribes have an interest and obligation to protect those resources which are important to their culture and religion. In court there have been sub-settlement agreements on each of those major issues, with fish spearing being the first issue to enter court. A current area if importance is tribes' right to harvest-wild rice.

The "Stipulation Agreement for Wild Rice" is binding on the state of Wisconsin. This stipulation does not only affect the WDNR-but the entire state and all its agencies including WisDOT. Therefore, it is recommended WisDOT pay attention to these stipulations and possible impacts. For example, when the Wisconsin DNR has a project that affects waters that flow to waters that has wild rice- the WDNR has to assess it and receive response from tribes as to whether or not it is going to affect the wild rice. The WDNR expects that WisDOT will see this coming up with its projects as well.

The most likely scenario for a negative impact is if there is a major erosion control problem that creates turbulent "chocolate" water that affects a wild rice growth area. This potential scenario could demand a lot of attention if it happens. The reason this is included in the environmental commitment is that it is important to be especially aware of those special sensitive resources and future projects that could affect them.

This is a special, unique, environmental commitment and tracking these situations will be essential (20). In the future, there are other related concerns to be aware of since tribes have solicited and at times attained authority over certain environmental standards including air quality and regulation of water quality. Those two issues alone can have a large impact upon potential transportation projects, and the tribes are likely to have expectation of commitments. This is likely to become greater in the future as they have jurisdictions and authority over some of these issues. This situation is very unique to the northern corner of the state. The rest of the state is less affected by these responsibilities. All Wisconsin agencies need to understand the meaning, importance, and consequence behind ceded territory.

VII. Case Studies

In addition to the research conducted to identify environmental commitments made by WisDOT that require maintenance and monitoring, these three case studies look more in depth at current conditions of existing commitments.

The three case studies include turtle walls on State highway 61 near Boscobel, ecopassages on the Burlington Bypass, and highway wayside signs identifying historical, environmental, and cultural resources of Wisconsin.

1. Case Study #1: Turtle Barriers

The first case study considers walls which prevent turtles from getting killed on the roadway. As highway 61 disturbs and divides habitat for the Blanding's Turtle, the walls are an environmental commitment made to protect the turtles from vehicle collisions. In Wisconsin, WisDOT uses wildlife barriers such as walls and fences as safety features on roadways to prevent auto-wildlife collisions and protect threatened and endangered species.

The Blanding's Turtle, a Wisconsin State threatened species, is naturally determined to reach the habitat of its choice. It will climb very steep banks and attempt to cross dangerous roadways to reach a desired location, especially when selecting a location to lay eggs. Therefore, even when roadways have steep banks which are challenging for a turtle to crawl up, a fence or wall is still necessary in order to prevent mortality (9).

Figure 17 shows a newly constructed Turtle Wall on State highway 61 near Boscobel. The wall is designed to prevent

Figure 17 New Turtle Barrier
Photo Credit: Bob Swartz

Figure 18 Turtle Wall Covered in Grasses
Photo Credit: Bob Swartz

Blanding's Turtles and other small wildlife from crossing the roadway at grade. These fences often funnel wildlife towards an ecopassage. In the case of these walls, an ecopassage is not used.

Figure 18, which shows the same area as in Figure 17, demonstrates that as time passes, this wall will need to have maintenance in order to function properly due to growth of nearby grasses. The first year this fencing worked well. In following years the grass grew up and fell over the fences, creating a "turtle ramp" allowing the turtles to access the highway again, resulting in turtle loss (16, 18).

In this case, there are one or two field entrances where the wall on the west side is breached to allow vehicles to access the river bank. If a turtle walks far enough along the wall, it will come to one of these field entrances, where it can still get up onto the road. Fences should be designed with turtle "turnarounds" that redirect the turtle from the road at the end of the fence, as pictured in Figure 35.

Another problem with this type of wall is that over time erosion near the wall has resulted in gaps under the barrier where smaller turtles could slip under (16). Currently, cyclone fencing is recommended rather than wooden walls. Cyclone fencing should be buried so that a two-three feet of fencing is underground and a few feet are above the ground. Cyclone fencing can also be designed to create a "turnaround" encouraging the turtle to go back the other direction rather than continue towards the field entrance opening.

There is also a concern about human safety hazards using the wooden fence. The wall may create a ledge in winter that cannot be seen by ATV riders. This could cause for dangerous turnovers of the ATV's. Cyclone fencing is also best for this reason. Cyclone fencing is becoming a more likely choice for fencing; examples are included in the Burlington Bypass Ecopassage case study.

Figure 19 Blanding's Turtle
Photo Credit: A. Sheldon

Recommendations for monitoring and maintenance of wildlife crossings and barriers have been suggested by numerous agencies.

The commitments may be monitored best in spring after snow thaw; at that point they can be assessed for damage (20). Monitoring and maintenance can be verified and documented in the tracking tool to confirm working condition, management needs and verification of follow through on repairs.

A mid-summer mowing plan timed with mating movements of the turtles and grass growth could also be developed in accordance with other management needs in the right of way area. One challenge is identifying funding as County Highway Departments need WisDOT to fund mowing and maintenance. Another concern with walls and fences is that they can become damaged over time by fallen tree limbs from nearby trees or from cars that go off the roadway. Driver's insurance should compensate for property damaged by cars (16, 18).

One possible solution is to develop partnerships with local private or non-profit organizations that are interested in threatened and endangered wildlife or habitat preservation. Modeled after the "adopt a highway" programs for picking trash up along highways, it may be possible to incorporate this spirit of volunteerism on particular projects. Since maintenance may not require large operating equipment, it may be possible to train a local volunteer group to perform maintenance and monitoring of these features.

Figure 21 Cyclone Fencing
Photo Credit: Stacy Cook

Figure 20 Cyclone Fencing
Photo Credit: Stacy Cook

2. Case Study #2: Ecopassages on the Burlington Bypass

Case study #2 examines ecopassages that were installed on the Burlington Bypass in 2006. These ecopassages connect the Blanding's turtle habitat that was divided when the new roadway crossed through a wetland.

Figure 23 Wetlands Divided by the Burlington Bypass
Photo Credit: Stacy Cook

Figure 22 Blanding's Turtle Habitat
Photo Credit: Stacy Cook

Figure 24 Location of Ecopassages
Source: Google Maps

Technical Description of the Ecopassages, Source: Andy Smeja, WisDOT:

Eco-Passage #1

The first ecopassage is located at station 1308+00 on the plans, which will be located between STH 11 and Ketterhagen Road on the east side of the Burlington Bypass. It will be 2800 feet north of STH 11 and 2500 feet south of Ketterhagen Road. This ecopassage will be a 162-foot long 63" high by 98" wide elliptical culvert pipe. The pipe will be filled to a depth of 1'-7" salvaged topsoil for ecopassages. This will result in a vertical clear space of 3'-8" in the ecopassage. To bring as much light as possible into the ecopassage, a 10' x 10' grate will be constructed in the median of the bypass and 3'-6" x 10' grates will be constructed on each outside shoulder. To help funnel the wildlife into the ecopassages, retaining walls will be constructed parallel to the bypass. On the east side of the bypass the retaining wall will extend 400 feet south and 800 feet north of the ecopassage for a total length of 1200 feet. On the west side of the bypass the retaining wall will extend 300 feet south and 1600 feet north of the ecopassage for a total length of 1900 feet.

Eco-Passage #2

The second ecopassage is located at station 1349+00 on the plans, which will be located between Ketterhagen Road and CTH A on the east side of the Burlington Bypass. It will be 1600 feet north of Ketterhagen Road and 2000 feet south of CTH A. This ecopassage will be a 168-foot long 63" high by 98" wide elliptical culvert pipe. The pipe will be filled to a depth of 1'-7" salvaged topsoil for ecopassages. This will result in a vertical clear space of 3'-8" in the ecopassage. To bring as much light as possible into the ecopassage, a 10' x 10' grate will be constructed in the median of the bypass and 3'-6" x 10' grates will be constructed on each outside shoulder. To help funnel the wildlife into the ecopassages, retaining walls will be constructed parallel to the bypass. On the east side of the bypass the retaining wall will extend 300 feet south and 300 feet north of the ecopassage for a total length of 600 feet. On the west side of the bypass the retaining wall will extend 300 feet south and 300 feet north of the ecopassage for a total length of 600 feet.

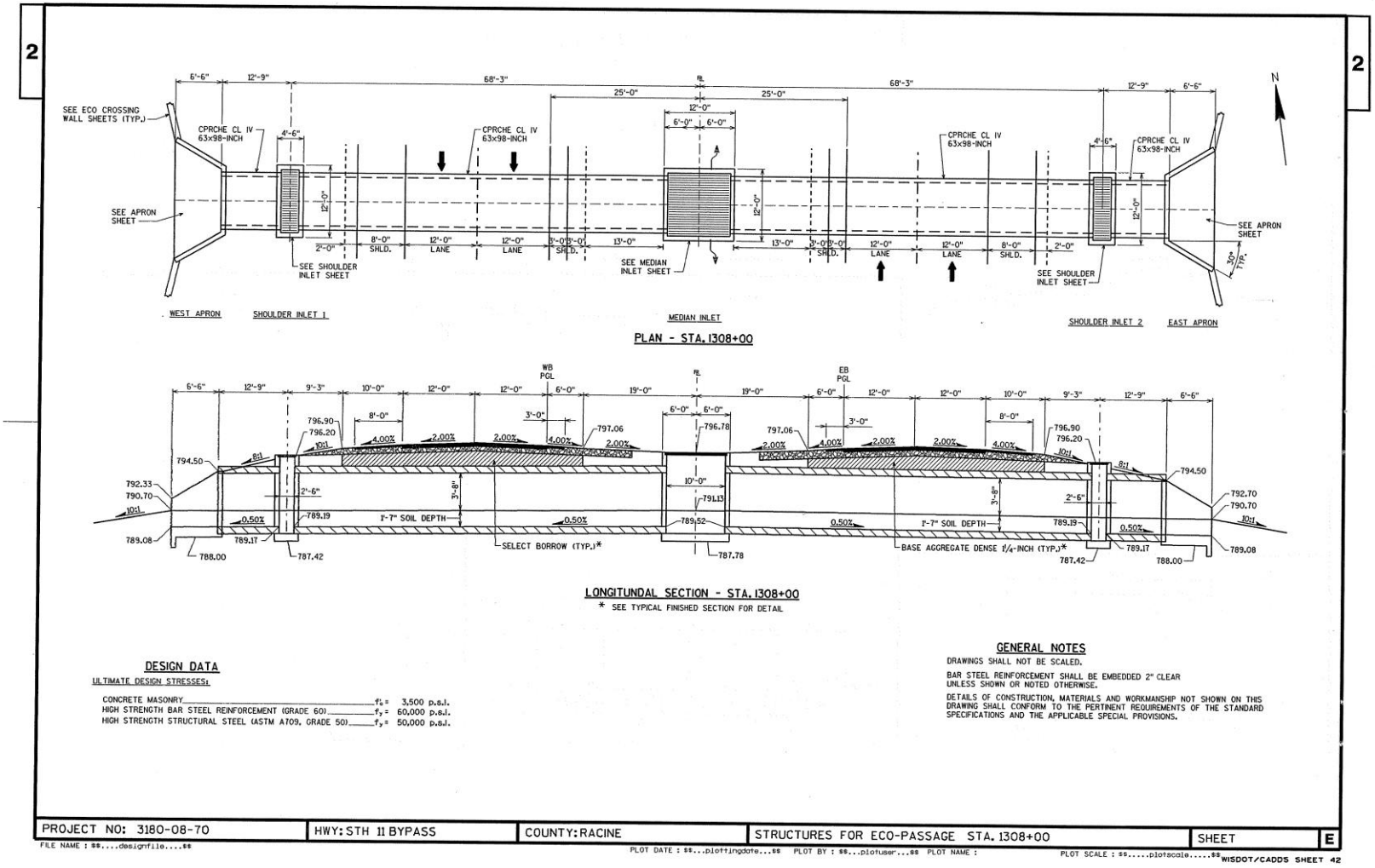


Figure 25 As-built of Ecopassage
Source: WisDOT

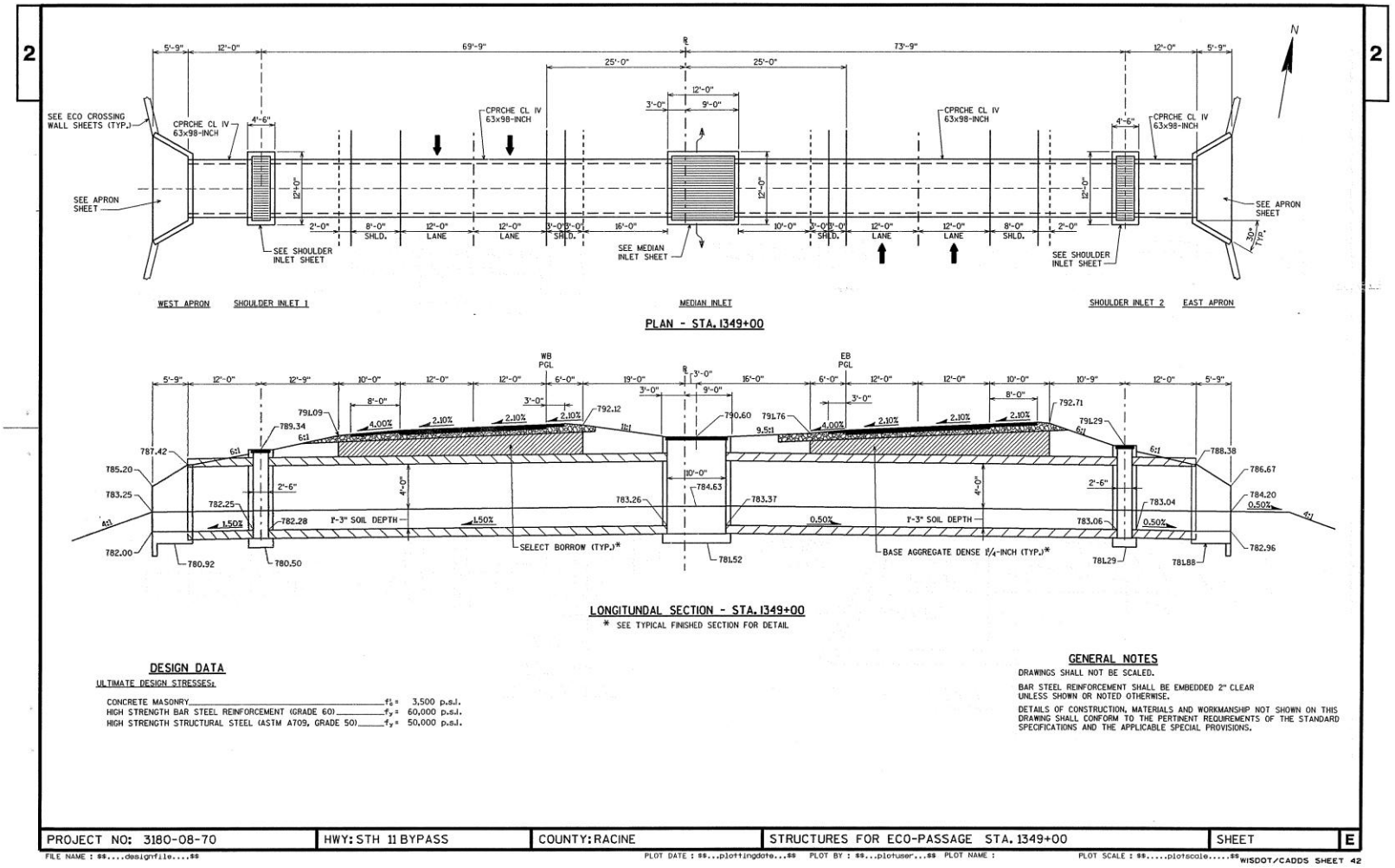


Figure 26 As-built of Ecopassage
Source: WisDOT

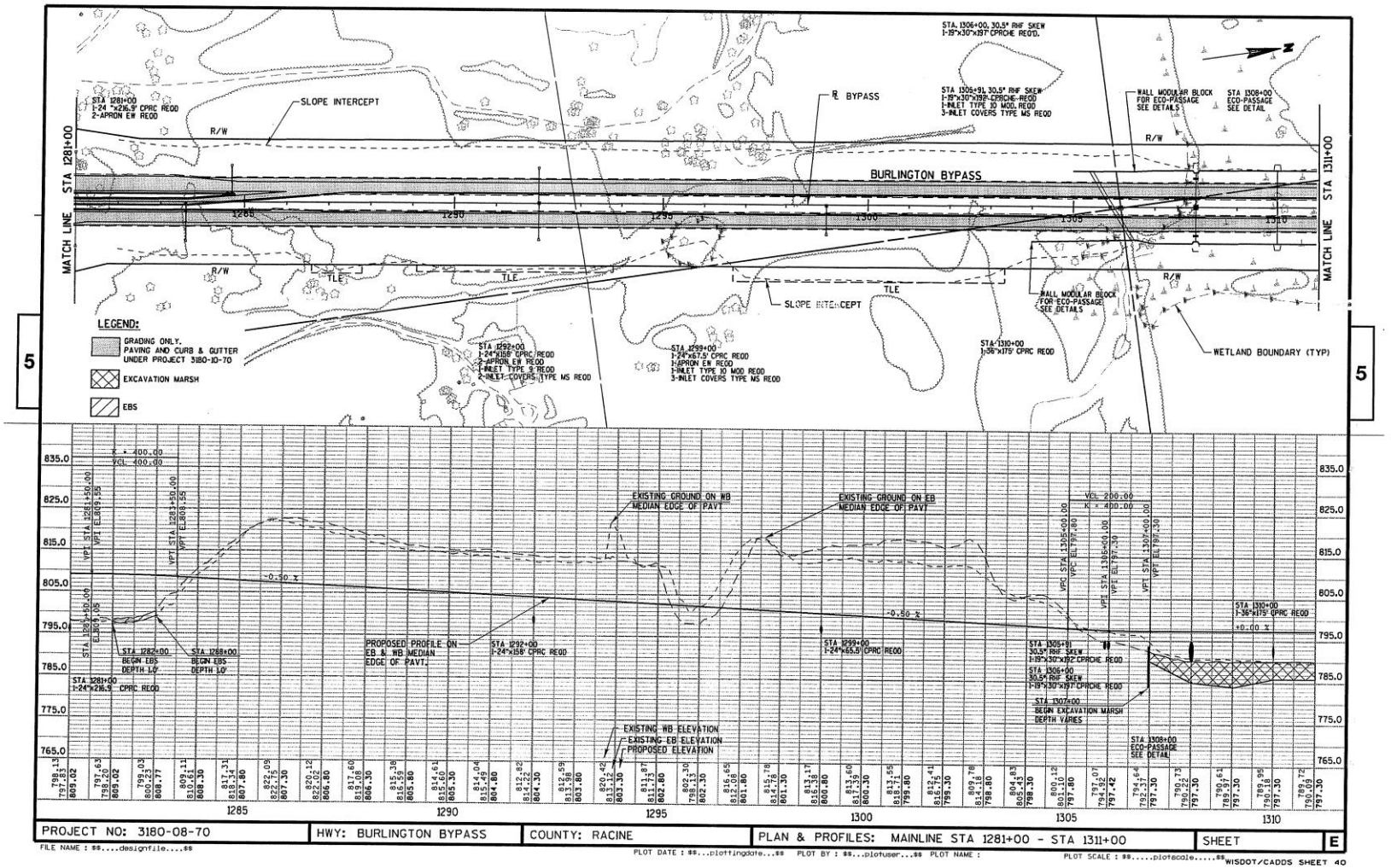


Figure 27 As-built of Ecopassage
Source: WisDOT

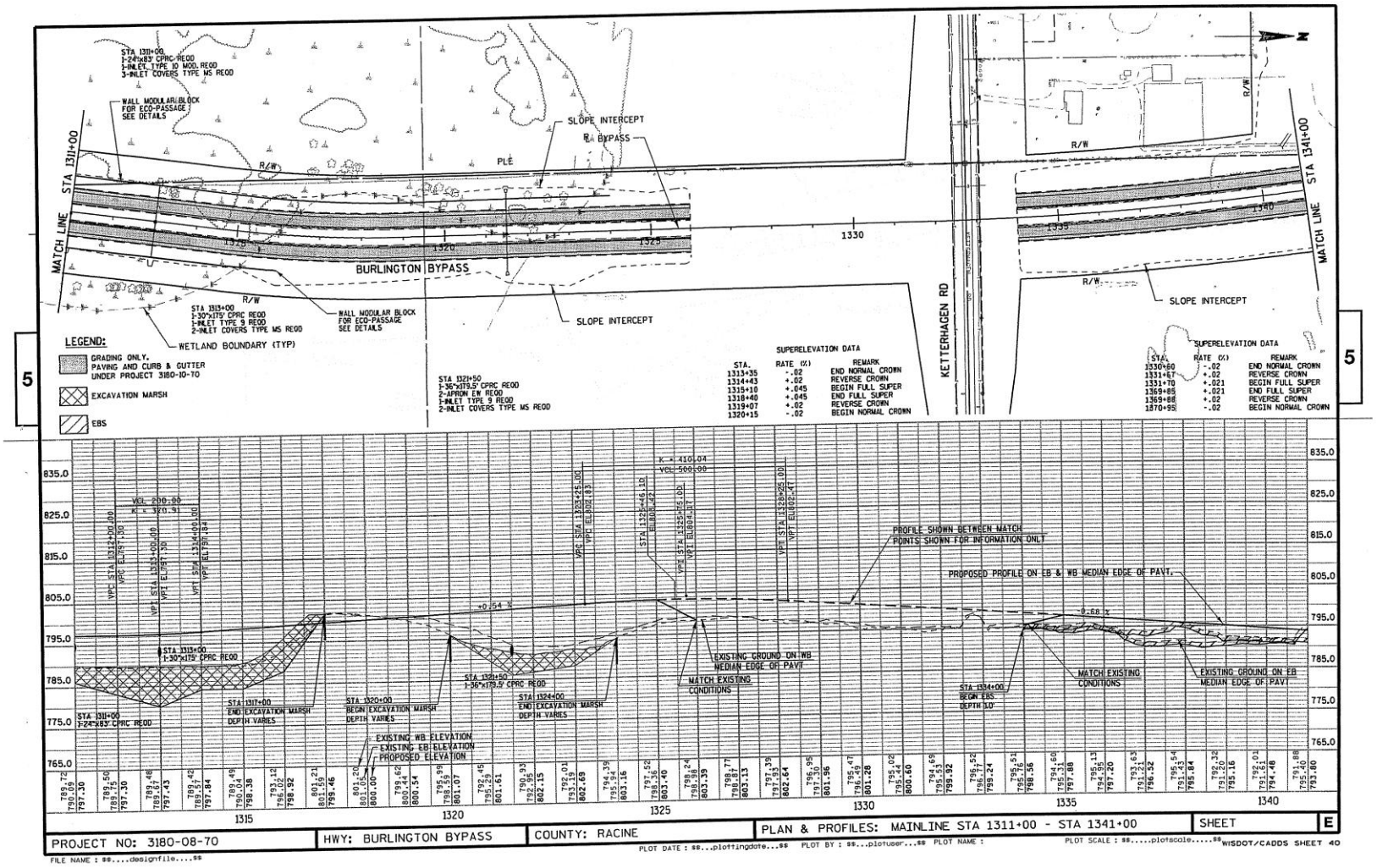


Figure 28 As-built of Ecopassage
Source: WisDOT

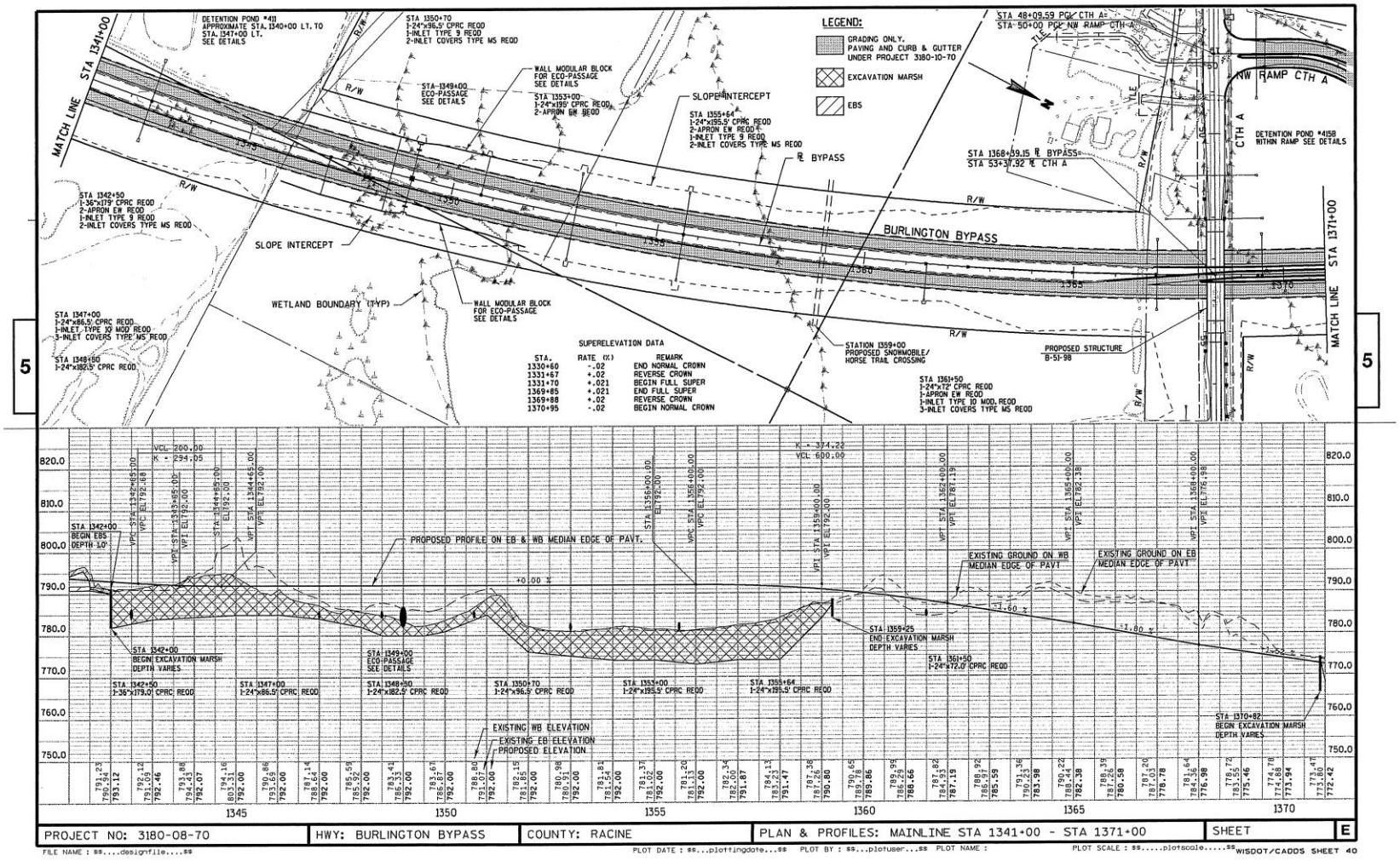


Figure 29 As Built of Ecopassage
Source: WisDOT

Daylighting and the length of a crossing are both important in designing ecopassages. If the passages are too dark or too long, wildlife may not enter the passages. In the photos shown in Figures 30 and 31, day lit ecopassages are being installed on the new roadway. This design includes cyclone funnel fencing to the entrances and requires grates to be installed at the median of the roadway above the passage, so that light filters into the passage. These grates and opening need to be checked for debris or blockages that may prevent light passage.

Figure 30 Installing Day lit Ecopassages
Photo Credit: Gary Birch, WisDOT

Figure 31 Installing Ecopassages
Photo Credit: Gary Birch, WisDOT

Figure 32 Ecopassage Condition, Summer, 2008
Photo Credit: Karla Leithoff, WisDOT

Current conditions:

The current conditions of the ecopassages show some fill of sand and debris compared to the 2008 photo shown in Figure 32. In addition, many tracks were imprinted in the sand at the western entrance; few were visible at the east entrance. This may suggest a raccoon or other predator may be using the passage. Monitoring may be valuable to provide insight into whether any predators are dwelling in the ecopassages and preying on turtles. The most recent photos taken in April, 2009 (Figures 37 and 38) show that the daylighting feature was functioning well. The ecopassages were well lit; it is easy to see through to the median. Figures 33 and 34 show current conditions of the grates which provide daylighting. A small bit of debris is shown, but there is no significant cover of the grates. Overall, the current condition of the ecopassage is acceptable, which may indicate that the passages would not need to be cleaned on a yearly basis. However, it is recommended that the ecopassages be monitored and during the monitoring process staff can determine if the level of debris found in the culverts is preventing use by the turtles. It is possible a certain amount of sand, mud, and natural debris such as vegetation may make the passages attractive to the turtles as it would mimic the natural environment of the wetland to some extent.

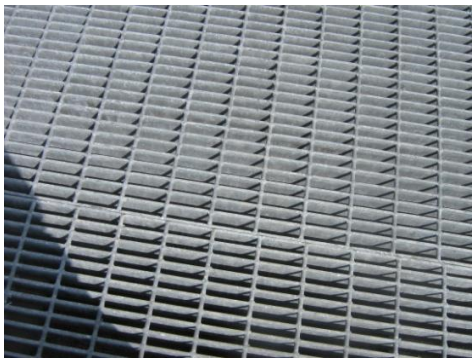


Figure 33 Current Conditions of Daylighting Grates
Photo Credit: Stacy Cook

Figure 34 Current Conditions of Daylighting Grates
Photo Credit: Stacy Cook

Figure 35 Turn-Around Turtle Fencing
Photo Credit: Stacy Cook

Figure 36 View from West End of Ecopassage
Photo Credit: Stacy Cook

Figure 37 Current Conditions of Ecopassage
Photo Credit: Stacy Cook

Figure 38 Current Conditions of Ecopassage
Photo Credit: Stacy Cook

Figure 39 Wildlife Tracks at Entry to Ecopassage
Photo Credit: Stacy Cook

Figure 40 Tracks at Entry to Ecopassage
Photo Credit: Stacy Cook

Figure 41 Current Conditions, Eastern View
Photo Credit: Stacy Cook

Figure 42 Eastern Side -Turtle Fencing
Photo Credit: Stacy Cook

3. Case Study #3: Highway Rest Area Informative Signs

Location

- On eastbound I-94, milepost 124, near Millston in Jackson County
- GPS Coordinates: N 44° 13.809' W -90° 42.602'
- "Sphagnum Moss" Historical Marker located on site
- "Winnebago Indians" Historical Marker located on site
- "Karner Blue Butterfly" and "The Barrens" plaques in prairie demonstration plot

Figure 43 Wisconsin Rest Area #53
Photo Credit: Stacy Cook

Case Study #3 examines the current state of informative highway wayside signs regarding important archeological, historical and environmental features in Wisconsin. The signs featured in this case study are from Rest Area 53 south of Black River Falls on I-94 (south). Informative signs featuring historical and cultural resources are a way to acknowledge the value of such resources and educate travelers about Wisconsin. The signs featured at this rest stop describe unique environmental features, landscape, local wildlife, and cultural and historical relevance of the area to Wisconsin. Overall, the signs are in very good condition currently. The wooden signs in Figures 50-53 appear to have been recently painted. The lettering is easy to read, and the overall structure is in very good condition. The smaller plaques describing the Karner Blue Butterfly and the Barrens geography and wildlife are legible, but look aged. The photos in Figures 45 and 46 show that moisture is accumulating below the plastic cover and is reducing the quality of the sign below. The Barrens sign mentions that behind it are plants that are common to the traditional local landscape. Due to the time of year of assessment, the vegetated area is not able to be assessed, but it appears to be maintained on a regular basis.

The Rest Area Maintenance plan is unique and it demonstrates successful creative partnerships. As explained on the WisDOT website

> An entire team of people work cooperatively behind the scenes to keep our rest areas and waysides clean, safe and in good working order. Local Community Rehabilitation Programs (CRP) provide the day-to-day maintenance at each rest area and some waysides. The CRP's provide employment for people with disabilities who might otherwise have limited employment opportunities. Rehabilitation For Wisconsin (RFW), a private non-profit organization, is responsible for direction of the CRP's at each rest area.

Establishing mutually beneficial partnerships may be a way that Wisconsin can successfully maintain environmental commitments.. By partnering with organizations such as CRP, non-profit environmental groups, social organizations, schools and universities, successful programs may be established that include local communities in caring for their regional environment, while simultaneously assisting WisDOT to achieve potentially overwhelming tasks such as invasive species management.

Figure 44 Karner Blue Butterfly Plaque
Photo Credit: Stacy Cook

Figure 45 Lower Left Corner of Karner Blue Butterfly Plaque
Photo Credit: Stacy Cook

Figure 46 Upper Right Corner of Karner Blue Butterfly Plaque
Photo Credit: Stacy Cook

Figure 47 View of Plaques with Prairie Demonstration
Photo Credit: Stacy Cook

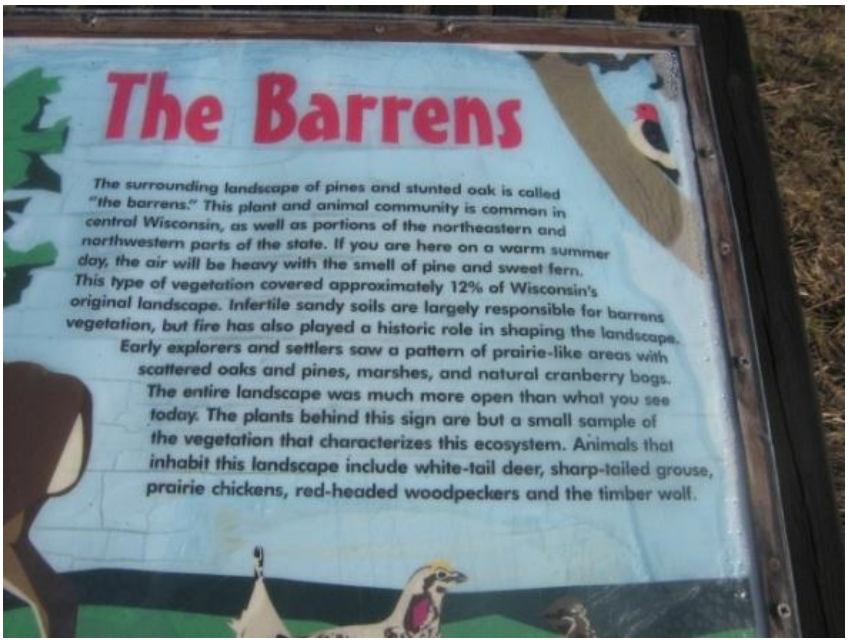


Figure 48 Barrens Plaque
Photo Credit: Stacy Cook

Figure 49 Lower Left Corner Barrens Plaque
Photo Credit: Stacy Cook

Figure 50 Official Marker on Winnebago Indian Sign
Photo Credit: Stacy Cook

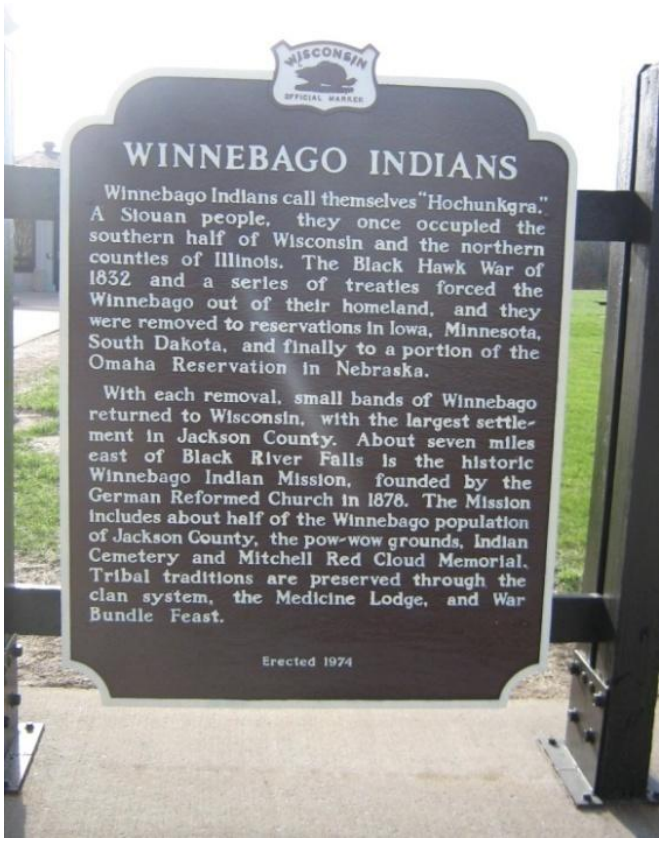


Figure 51 Official Marker
Photo Credit: Stacy Cook

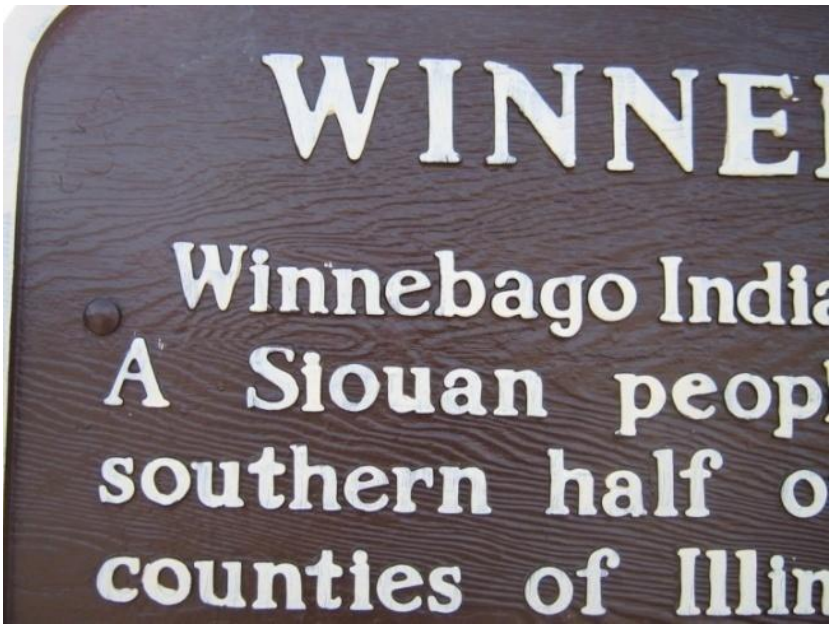


Figure 52 Text on Official Marker
Photo Credit: Stacy Cook

Figure 53 Official Marker Close-up
Photo Credit: Stacy Cook

VIII. Tracking Tool Development

Overview:

There is good potential for full implementation of the tracking tool which was designed using the Microsoft Office Excel program. This was software chosen for tool development based on recommendations from WisDOT staff, especially at the request of Dan Scudder, Chief of WisDOT's Environmental Services Section. Other software programs have more sophisticated tools for tracking, however Excel was chosen for its user-friendliness, staff familiarity with the program, widespread access to the software and easy data sharing. The tracking tool is designed as an interactive spreadsheet, meaning data in columns can be easily sorted by the user. A user guide is provided in the Appendix and online at www.wistrans.org. The user guide can be referenced for details on use of the spreadsheet.

Goals of the tracking tool:

- Provide an easy-to-use system for tracking environmental commitments which need maintenance or monitoring after project completion.
- Provide a tracking system which allows WisDOT staff uninterrupted access to the data they are tracking.
- Provide a tracking system which allows for easy data sorting and sharing.
- Provide a tracking system which allows for report generation and task identification.
- Provide a tracking system which will provide for a statewide overview as to the current practices of maintaining and monitoring environmental commitments.

Goals of the User Guide:

- Provide a detailed description of the types of information which may be tracked using this tool.
- Provide a description of how to sort data.
- Provide a description of annual system maintenance.
- Provide a detailed description of implementation of the tracking tool.

Challenges in developing the tool

One challenge in using a spreadsheet for tracking is its limitations for tracking over time. A spreadsheet is two-dimensional, allowing relation of data in rows and columns. Therefore, identifying the simplest and best way to track maintenance and monitoring needs from year to year posed a challenge. In order to add the third dimension of time to the tracking tool, use of multiple worksheets was considered the best option. One worksheet would be used per calendar year. This allows simple reference to information about maintenance and monitoring conducted in previous years, and data to be input about what should be done the following year.

Another challenge is presentation of data in printed form. Data was carefully analyzed before being added as a required column on the tracking tool. Nevertheless, the width of the worksheet is still more than 10 cells wide, which makes printing easy-to-read versions of the worksheet challenging. This is also a reason why it was determined best to use multiple worksheets for tracking year-to year instead of extending the worksheet horizontally to track year-to-year maintenance.

IX. Possible Barriers to Tracking Tool Implementation

A. Staff Time

WisDOT staff time for utilizing tracking programs is limited. If staff gets behind in tracking data input, the program becomes less useful and relevant, and is less likely to be utilized. Therefore, the tool needs to require minimal input and staff time in order to be valued and considered feasible by WisDOT staff. The literature review suggested that when agency staff needs to learn a new computer program in order to use a tracking tool it is a primary barrier in program implementation. This concept was confirmed in staff interviews. Data input for the tracking tool was designed to be at a minimum in recognition that the more data a tracking program requires the easier it is for staff to fall behind in entry and therefore abandon program use. At this point, it is not possible to link this tracking tool with other programs used by WisDOT, as none of the programs offer this capability. An advantage to the tracking tool is that the time horizon for tracking most commitments is fairly long, usually over a span of several years. The combination of inputs being limited to specific environment commitments added to the tracking tool upon completion of projects and a long time horizon should allow the program to avoid being quickly dated.

B. Funds for maintenance

Currently, Wisconsin, like most states of the nation, is experiencing budget shortfalls. At this point, new funding is not likely to be dedicated to maintenance. Traditionally, maintenance such as mowing and similar services falls to a County Highway Department maintenance team. However, the county needs to be paid for those services. A number of the problems regarding maintenance are found in the funding structure for projects. Once "the lines are painted and seed thrown out" project funding ends and maintenance is passed to the County Highway Department. County Highway Departments will follow up on that maintenance if they are paid, as explained previously, but they will also need a way of having information about environmentally sensitive areas that need special care.

C. Customary practice to "walk away" after a project closes

Customarily, once a transportation project is complete, WisDOT environmental staff does not have follow up regarding details of construction. Long term monitoring and maintenance of environmental features requires a new method of considering transportation project maintenance management. Therefore, adoption of this new perspective is necessary by WisDOT staff who manages projects and environmental responsibilities. A new level of communication is necessary amongst environmental coordinators, BEES staff, and County Highway Departments maintenance staff to achieve the best maintenance of these various features in the most cost-effective way while utilizing good time-management.

D. Staff use of tracking tool

In general, if a tool is too complicated, time demanding, or is not considered useful, it will not likely be used. The literature review suggests that staff buy-in on use of a tracking tool is an important component of implementation. This tool has been designed with these considerations in mind. Despite the lack of funds for maintenance today, staff will hopefully see the value in keeping record of what commitments are made, and what maintenance is needed, in order that as much maintenance and monitoring can be conducted despite current funding challenges and utilized in the future as well. Many environmental coordinators expressed an interest in a system to help track commitments, but also expressed concerns that they want to have control over their data. They said that when they enter data in the program they want to be sure it's enduring and accessible, so that they always have a file

copy of their own. Concerns were expressed regarding online data entry, especially since it can be lost if WisDOT no longer supports the online program due to information technology changes. These requests have been acknowledge in design of the tracking tool.

X. Implementation and Recommendations

The literature review, project final report and tracking tool will be provided to all WisDOT staff that would have potential use of the tool in June, 2009. A copy of the final report, Microsoft Excel tracking tool and User's Guide which is provided in the Appendix and will be available online at www.wistrans.org in electronic format to assist in use of the tracking tool will also be provided.

XI. Future Opportunities

As computer software technology advances, becomes more economical and is common place among staff skills, opportunities will become more plausible to use other systems for tracking. For example, GIS technologies provide excellent opportunities for tracking, and use of a GIS system may be a good option for consideration by WisDOT in the future for tracking commitments and environmental management needs. One column in the current spreadsheet tracking system has been dedicated to record GPS coordinates of environmental commitments so that in the future their locations can be geo-coded in a GIS system. GIS will be excellent for spatial analysis, creation of maps to show commitment locations, tracking maintenance and monitoring, and resources committed to tracking.

Currently, a GIS Enterprise system is available for approximately $40,000. This system would allow users in the WisDOT Regions around the state to enter and edit information on one consolidated system. A GIS specialist from ESRI recommend that such a system should be maintained by an information technology department within the agency. Additional information can be found regarding this software at www.esri.com.

XII. References

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4 Retrieved January 30, 2009 from: http://www.epa.gov/compliance/resources/faqs/nepa/index.html#a1

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6. Shaping Dane, Retrieved January 30, 2009 from: http://www.lic.wisc.edu/shapingdane/resources/planning/library/book/chapter10/chap10_10.htm

7 Retrieved January 30, 2009 from: http://epg.modot.mo.gov/index.php?title=127.23_Negotiated_Commitments_and_Mitigation_in_the_National_Environmental_Policy_Act_(NEPA)_Process

8 Retrieved January 30, 2009 from: http://ceq.hss.doe.gov/Nepa/regs/ceq/1508.htm#1508.1

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10 National Historic Preservation Act of 1966, as amended, Section 1

11 http://www.idahohistory.net/section106.html

12 Facilities Development Manual Wisconsin Department of Transportation, Chapter 26 Historical Preservation Section 1 General, Subject 5 Overall Process

13 Rosie Meer, Environmental Coordinator, WisDOT

14 Mike Helmrick, Environmental Coordinator, WisDOT

15 James Becker, WisDOT

16 Robert Swartz, WisDOT

17 Retrieved January 30, 2009 from http://www.betterroads.com, "Critter Crossings and Sensors Keep Wildlife, Motorists Apart" Road Science, From the November 2006 issue of Better Roads Magazine, Tom Kuennen, Contributing Editor

18 Gary Birch, WisDOT BEES

19 Janet Smith, Environmental Coordinator, WisDOT

20 DNR Sources

21 Retrieved January 30, 2009 from: http://www.azgfd.gov/hgis/pdfs/CulvertGuidelinesforWildlifeCrossings.pdf

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24 Retrieved January 30, 2009 from: http://stream.fs.fed.us/fishxing/help/7_Culvert_Basics/Perched_Outlet.htm

25 Retrieved January 30, 2009 from: http://dnr.wi.gov/org/land/er/factsheets/mammals/wolf.htm

26 Retrieved January 30, 2009 from: http://www.wisconsinwetlands.org/phragmites.htm
27 Retrieved January 30, 2009 from: http://dnr.wi.gov/invasiveS/fact/loosestrife.htm

XIII. Appendix:

A. Work plan

B. User Guide for Tracking Tool

C. Inventory

D. Literature Review

A. Work plan

Description:

1. Problem Statement & Background:

Wisconsin has constructed many environmental mitigation projects in conjunction with transportation projects that have been implemented pursuant to the National Environmental Policy Act. Other mitigation projects have been constructed pursuant to discussions and negotiations with WDNR. These mitigation projects offset or replace a certain environmental function(s) lost as a result of construction of the transportation project. Examples include storm water management facilities, wetland replacement projects, stream restoration projects, reforestation projects, construction of sound walls, replacement of parklands and wildlife crossing structures.

In order for the environmental mitigation projects to continue to provide long term functionality intended when they were first constructed, they must be properly maintained, and when necessary, rehabilitated or reconstructed. These environmental mitigation projects may be considered as assets similar to other transportation features.

Wisconsin DOT (WisDOT) has identified the need for better understanding the costs of selected features in the overall scheme of project development and ongoing maintenance. Projects including cultural resources, routine hazmat commitments, wetlands, and wildlife accommodations are of particular interest at this time.

2. Objectives:

The goal of this project is to explore the current state of environmental mitigation project activities, discuss the literature on existing environmental inventory & asset management programs and develop an inventory of selected environmental mitigation features in Wisconsin. Specific objectives of the project are to:

- Collect documentation on existing cultural resources, hazardous materials, wetlands, and wildlife accommodation commitment throughout Wisconsin to compile an inventory of such information

- Provide a review of the state of the practice in other states and municipalities for collecting and tracking environmental commitments. Perform a detailed investigation of the reports contained in the WisDOT Transportation Synthesis Report (T.S.R.) on this topic dated 02/28/2008 provided by WisDOT.
- Develop electronic inventory and asset management tool to assist WisDOT managers in collecting this information
- Provide recommendations for additional inventory features by commitment and feature type and primary maintenance responsibilities.

3. Benefits:

The development of an inventory and tool for collecting and tracking environmental commitments, particularly those involving cultural resources, wetlands, hazmats, and wildlife accommodations will assist in the development of a full asset management system for environmental mitigation features. This tool will help WisDOT provide long term functionality intended when the mitigation features were first constructed. The research team will ensure that this inventory and tool will assist WisDOT managers identify and track regulatory and pledged commitments. This tool may help in the generation of the periodic environmental reports showing the level of resources committed to environmental regulation and mitigation. Ultimately, the use of an asset management system can help drive the design and construction of future projects by identifying good practices for environmental mitigation commitments as well as those that may not be cost effectively achieving their intended goals.

4. Detailed Work Plan:

Tasks

1. Review existing studies and asset management systems for environmental features. This literature review will include analysis with particular focus on Section 106 compliance for cultural resources, (historic properties & archaeology sites), wetlands, hazardous materials, and wildlife accommodations commitments.
2. Meet with WisDOT personnel in Regions, and central office and WDNR “Liaisons” as identified by WisDOT environmental staff to review existing procedures for collecting and tracking environmental commitments. Meetings with WisDOT and WDNR personal shall be coordinated through a WisDOT Environmental office contact.
3. Develop list of recommendations of priority environmental features for further exploration. These may include noise barriers, retaining walls, air quality, and culverts or crossings.
4. Develop and test tools and recommended processes to inventory and track past, current, and future projects.
5. Develop pertinent case studies. The research team will review plans at WisDOT archives, as-builts and thoroughly document current conditions of three case studies.
6. Discuss barriers to implementation and describe opportunities for continued development of technical memorandum.
7. Develop implementation strategies and provide guidance for using the tool to WisDOT managers.

Deliverables from Tasks 1 through 7:

- *Summary of literature review*
- *Inventory of relevant features*
- *Recommended tool for collecting and tracking commitments on selected features*
- *Best practices and strategy for implementation of tool and process*
- *Case studies of sample features*
- *Technical memorandum including recommendations for additional features*

5. Budget Requirements

See attached budget. Amount Requested from WisDOT: $30,000.

The administration of this contract will occur within the CFIRE, part of the Wisconsin Transportation Center at the University of Wisconsin. Subcontracts will be issued under the contract authority of the University of Wisconsin-Madison. No subcontracts are presently being considered.

6. Equipment and Facilities

The Wendt Engineering Library at UW-Madison will provide computerized searching capabilities, search and retrieval database services, and access to all technical documentations and professional journals required for this project. Computing facility is available in the CFIRE.
CFIRE will be provided with access to historic WisDOT environmental mitigation files and documents at WisDOT offices and archives.

7. Work Time Schedule/Deliverables

A schedule is provided for 12 months with the final project reporting completed by May 31, 2009.

Schedule

	Months											
Task/Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. Review existing studies	x	x	x									
2. Meet with DOT / WDNR	x	x	x	x								
3. Recommend other features		x	x	x				x	x	x		
4. Develop and test tool Inventory past and current projects					x	x	x	x	x	x		
5. Develop pertinent case studies					x	x	x	x	x			
6. Barriers to implementation							x	x	x	x	x	
7. Develop implementation strategies										x	x	
Final Report										x	x	x
Quarterly Reports		x			x			x			x	
Implementation Plan												x

8. Reports:

The following reports will be produced:

- 4 quarterly reports (Due on July 1, 2008; October 1, 2008, January 1, 2009, April 1, 2009)

- 1 technical memorandum
- 1 final report addressing all tasks and including an executive summary and an implementation plan . WisDOT will review a final report outline and a draft of the final report prior to publishing. The Final Report format will be in accordance with WisDOT Research Unit requirements.

9. Other Information:

The research team is led by Dr. Teresa Adams and Jason Bittner at the University of Wisconsin-Madison National Center for Freight and Infrastructure Research and Education. The team will be assisted by one graduate project assistant. Jason Bittner will be the primary contact for this project.

B. User's Guide

User's Guide to Environmental Commitments Tracking Tool

Overview:

The tracking tool was designed using the Microsoft Office Excel program. This was software chosen for tool development based on recommendations from WisDOT staff and at the request of Dan Scudder, Chief of WisDOT's Environmental Services Section. Other software programs have more sophisticated tools for tracking, however Excel was chosen for its user-friendliness, staff familiarity with the program, widespread access to the software and easy data sharing. The tracking tool is designed as an interactive spreadsheet, meaning data can be easily sorted by the user. This User Guide is designed to explain the goals of the tracking tool and to facilitate use of the tool. For additional information on use of Microsoft Excel, visit the company's website at: http://office.microsoft.com/en-us/excel/default.aspx

Goals of this tool:

Provide an easy-to-use system for tracking environmental commitments which need maintenance or monitoring after project completion.

Provide a tracking system which allows WisDOT staff uninterrupted access to the data they are tracking.

Provide a tracking system which allows for easy data sorting and sharing.

Provide a tracking system which allows for report generation and task identification.

Provide a tracking system which will provide a statewide overview of the current practices of maintaining and monitoring environmental commitments.

Goals of this User's Guide:

Provide a detailed description of the types of information which may be tracked using this tool.

Provide a description of how to sort data.

Provide a description of annual system maintenance.

Provide a detailed description of the implementation of the tracking tool.

How to use the tracking tool:

At this time, it is not possible to have the tool automatically sync with other software programs used by WisDOT for project management based on technical limitations of WisDOT systems and programs. Therefore, data must be input manually. However, the tool was designed in order to minimize data input to the greatest extent possible.

Types of information data which may be entered and tracked:

Vertical Columns

Vertical columns provide descriptive categories regarding information that can be entered for each environmental commitment in the rows below. When entering data that may be selected or sorted, it is essential to use a consistent format and correct spelling. For Example, for the "Region" column, the user should use "NE" every time for the North East Region, and US 10, rather than US/10 or US-10. Variations in spelling and format will create additional "sort categories" as described below.

Columns include information such as:

- Project number
- Location
- Date project completed
- Roadway
- Region
- County
- Organization responsible for Maintenance
- Agency/Organization/Company Responsible to Conduct Maintenance
- Specific Location information
- GPS Coordinates
- Category ID
- Feature Category
- Feature Description
- Environmental Commitment/Mitigation
- Recommended Maintenance/Monitoring
- Maintenance to be Conducted in year XXXX

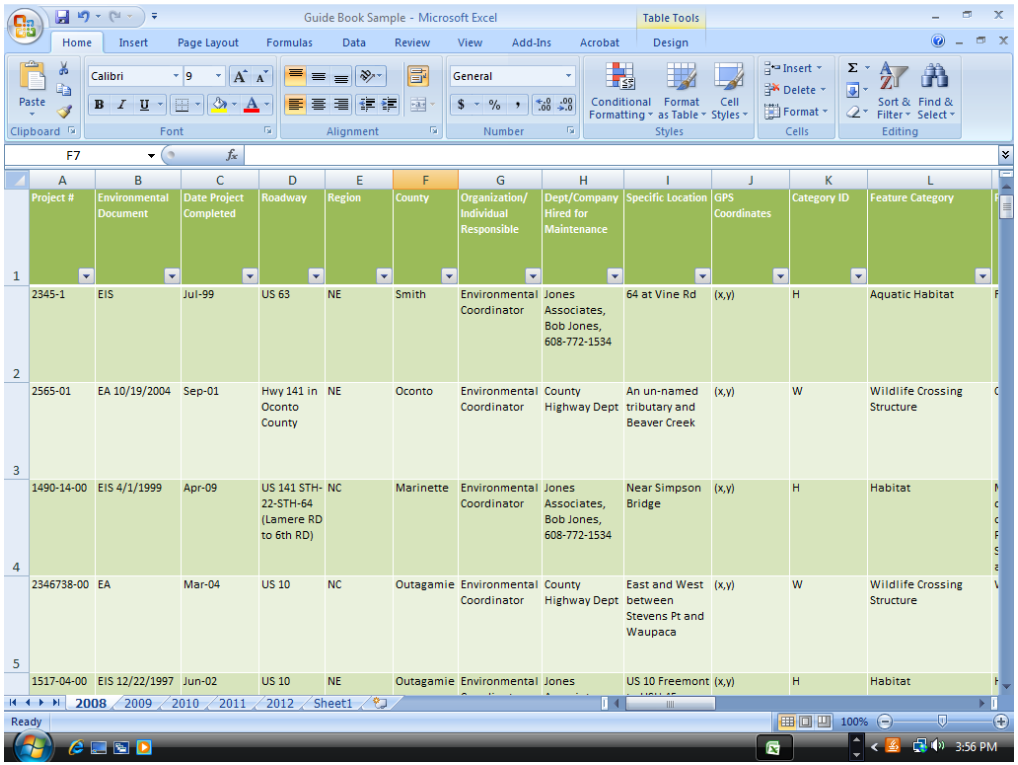
- Tasks to be completed
- Initial/Date
- Next Action Needed

Horizontal Rows

As shown in the green spreadsheet below, the first horizontal row has headings for fields to be entered in columns below.

- Each row below the heading is for an individual commitment
- Relevant information can be added beneath column headings.

Reading left to right, all of the information about an environmental commitment can be found. Therefore, in Row 2, all of the information in that row will relate to one specific environmental commitment, as depicted in the example below. Of particular importance are details to be added regarding what annual maintenance or monitoring needs to or has taken place.



Project #	Environmental Document	Date Project Completed	Roadway	Region	County	Organization/ Individual Responsible	Dept/Company Hired for Maintenance	Specific Location	GPS Coordinates	Category ID	Feature Category
2345-1	EIS	Jul-99	US 63	NE	Smith	Environmental Coordinator	Jones Associates, Bob Jones, 608-772-1534	64 at Vine Rd	(x,y)	H	Aquatic Habitat
2565-01	EA 10/19/2004	Sep-01	Hwy 141 in Oconto County	NE	Oconto	Environmental Coordinator	County Highway Dept	An un-named tributary and Beaver Creek	(x,y)	W	Wildlife Crossing Structure
1490-14-00	EIS 4/1/1999	Apr-09	US 141 STH-22-STH-64 (Lamere RD to 6th RD)	NC	Marinette	Environmental Coordinator	Jones Associates, Bob Jones, 608-772-1534	Near Simpson Bridge	(x,y)	H	Habitat
2346738-00	EA	Mar-04	US 10	NC	Outagamie	Environmental Coordinator	County Highway Dept	East and West between Stevens Pt and Waupaca	(x,y)	W	Wildlife Crossing Structure
1517-04-00	EIS 12/22/1997	Jun-02	US 10	NE	Outagamie	Environmental	Jones	US 10 Freemont	(x,y)	H	Habitat

For ease of use, all environmental commitments are to be recorded on the same spreadsheet for that year. However, commitments can be identified by Category ID, which is to be recorded in Column K. Categories of commitments include:

W- Wildlife Accommodation (Ecopassages, Walls)

H- Habitat

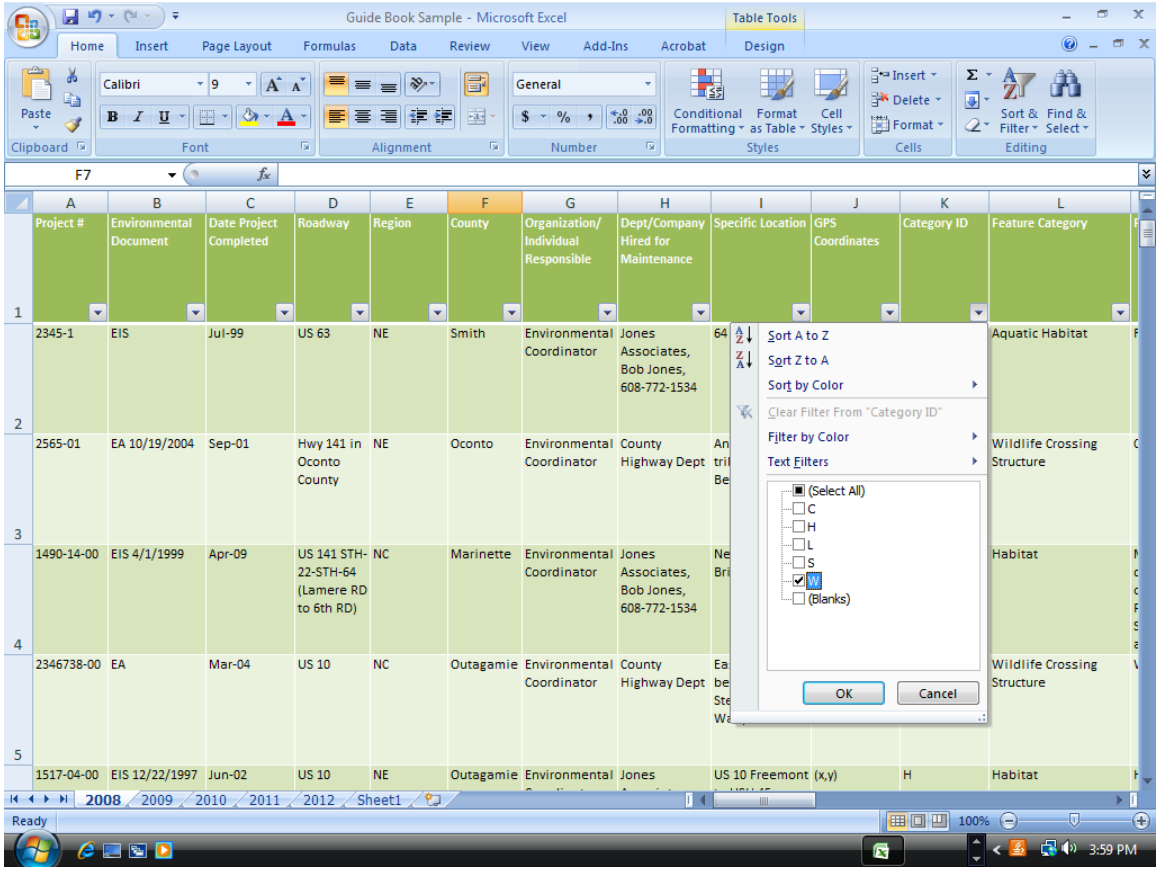
C- Cultural and Historical Resource Commitments

S- Stormwater Commitments

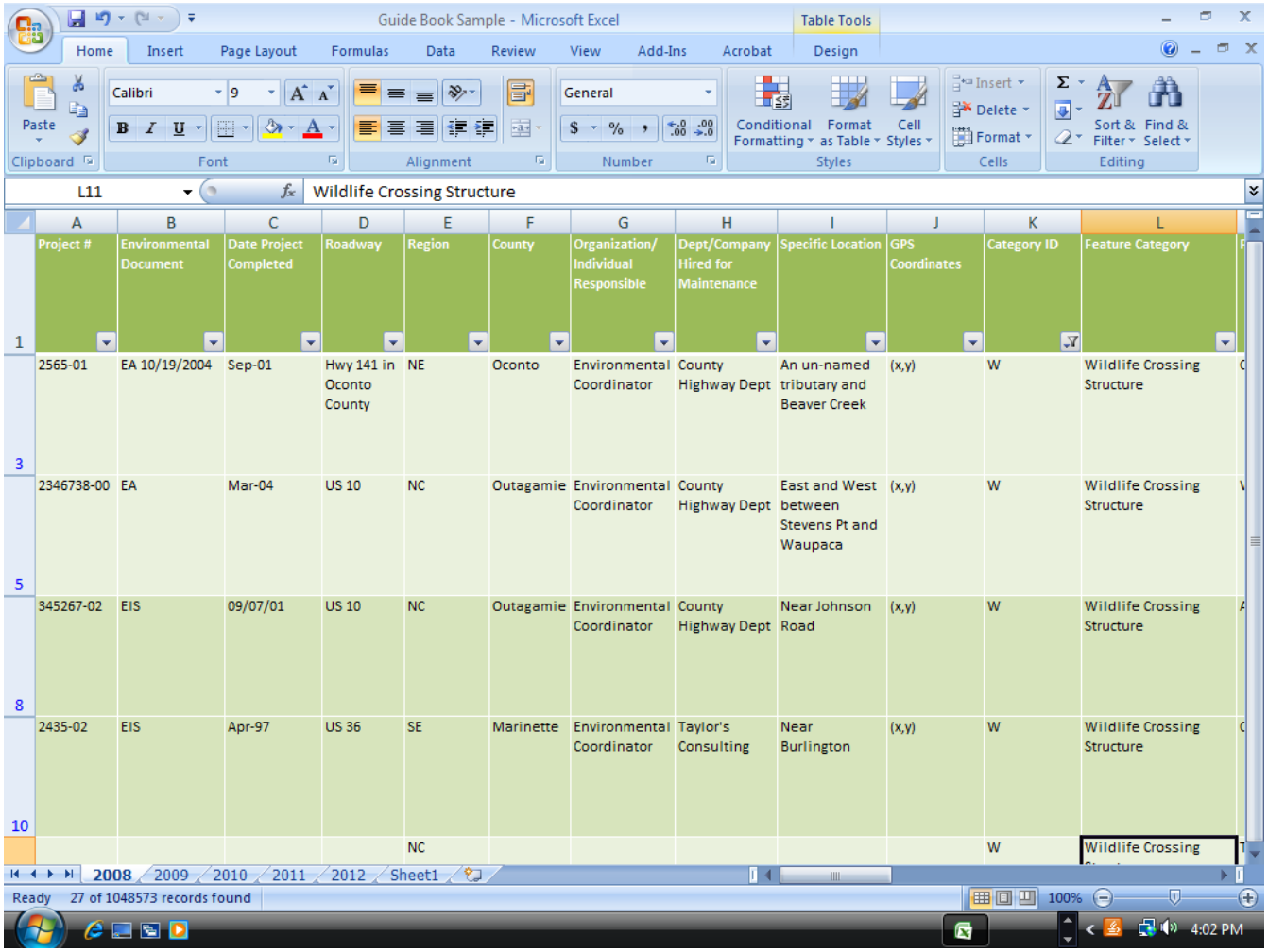
O- Other

How to sort data:

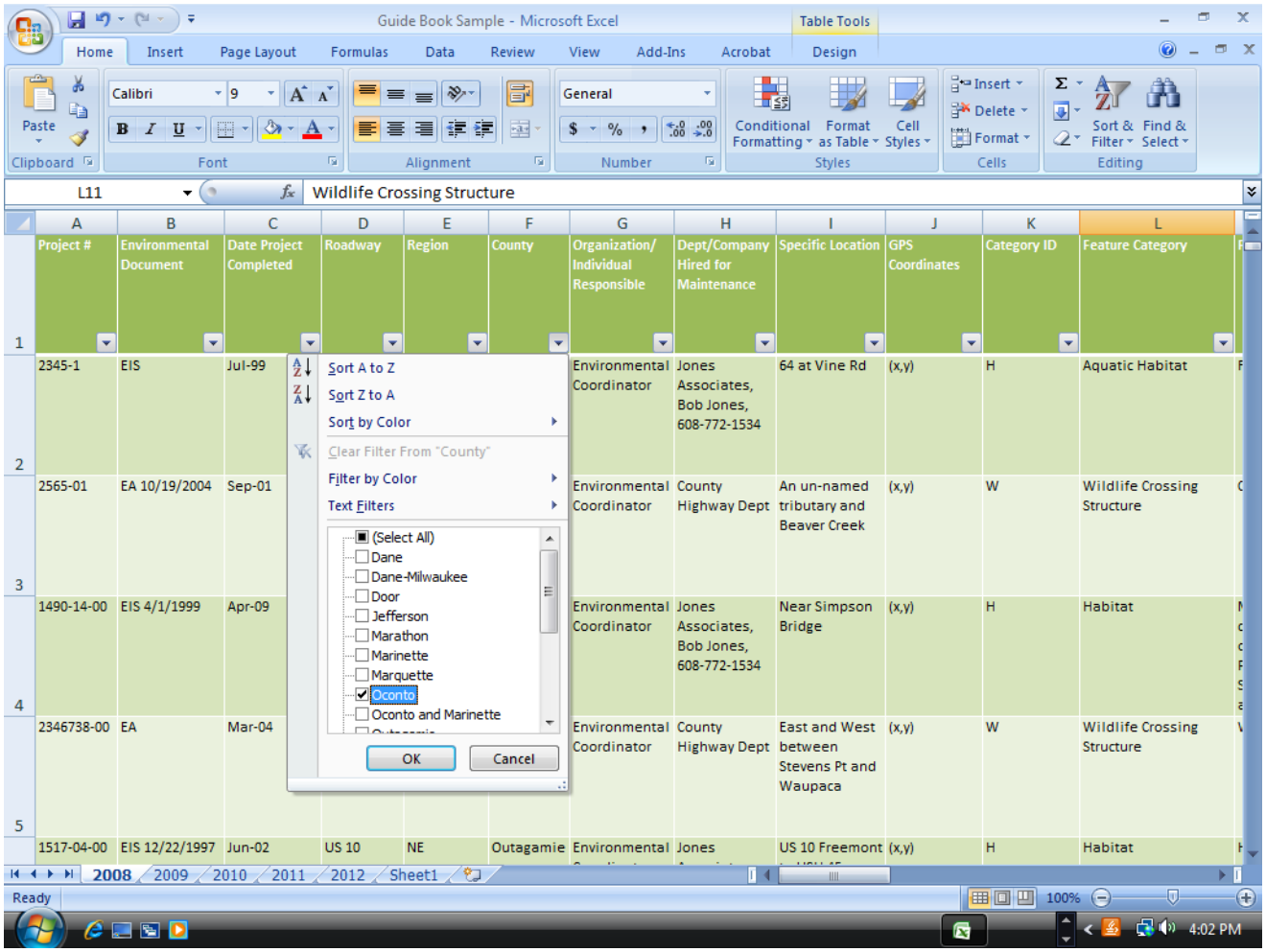
The more data that is entered into the spreadsheet; the more data sorting options will be available to the user. Each column can be used to sort all data related to each commitment. The spreadsheet should have arrows in the bottom right corner of each column in the first row. (If the program being used does not show this feature, follow the steps listed at the end of this section). The user can Left Click on this area and a drop box will appear, as can be seen in the image below. The user can select “filters” which in the case of the example below is the Category ID. If a user wants to identify all environmental commitments in a particular category such as Wildlife Accommodations, they can sort using Column K, in the drop down box, and select filter “W.”



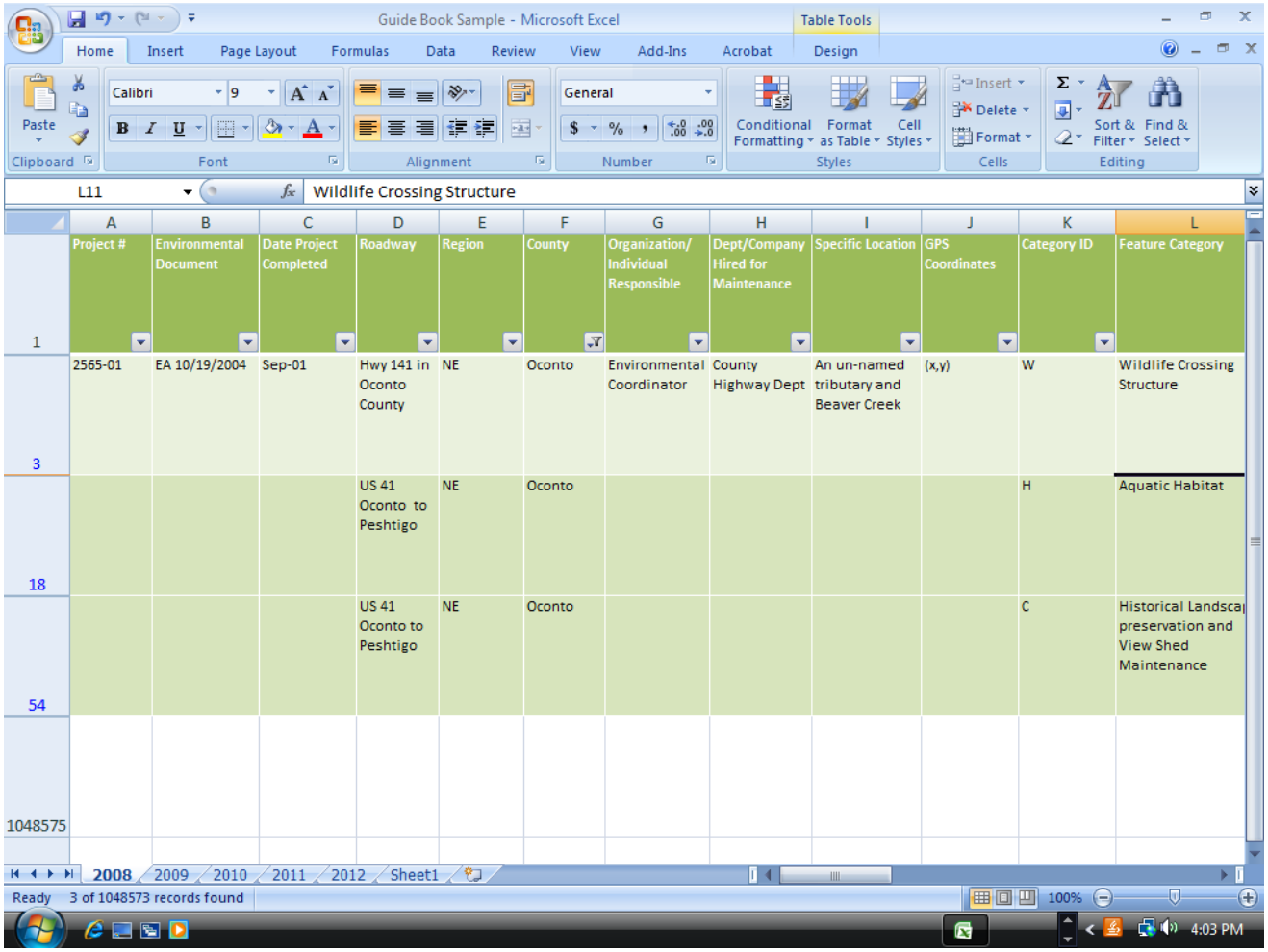
After sorting, the result will appear as in the image below: all commitments with Category ID “W” will be selected.



If the user wants to select and sort by any other column heading, a similar process would be used. For example, the user can sort by the “County” heading to identify all commitments in a particular County. This may be useful by WisDOT Region, or for BEES, when identifying what tasks may be requested of each County Highway Department in a particular season or year. It could also provide important information to a County Highway Department about sensitive environmental areas that may be important to avoid when conducting routine maintenance activities.

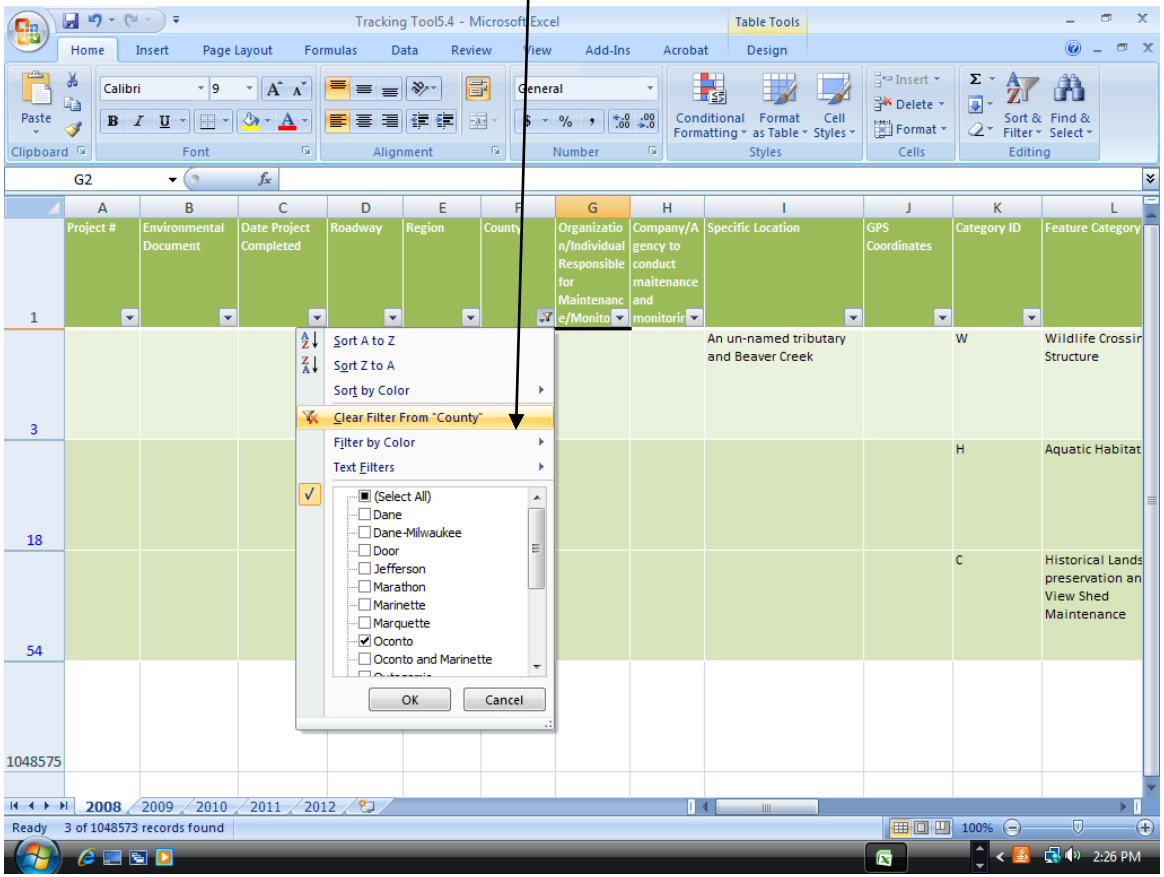


The result of a sort by county shows the following results:



To return to the full spreadsheet after sorting:

- Place the cursor on the drop down box which shows this  symbol to signal that a sorting selection has been made from that column.
- First Left Click, then
- Left Click on "Clear Filter from 'County'"

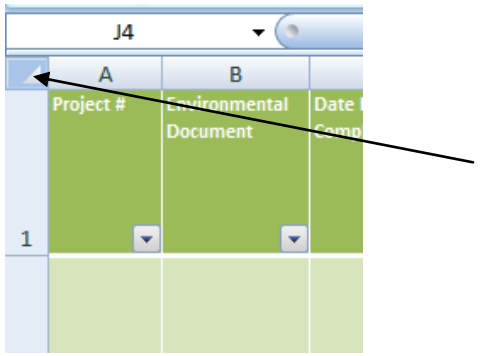


The full spreadsheet will then be displayed.

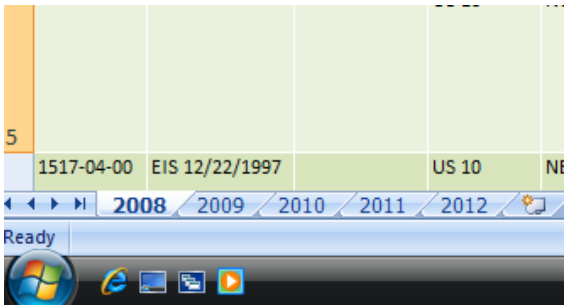
Annual Tracking Tool System Maintenance

Every year the worksheet should be copied and pasted into a new worksheet which is labeled for the new year. Any commitments that no longer need maintenance can be deleted from the new worksheet, but should not be deleted from the previous year's worksheet.

For example, to select the entire 2008 worksheet, Left Click in the box to the left of the Column A and above Row 1



- Right Click
- Choose "Copy"
- Go to the next year's worksheet
- Left Click on the same box on this new worksheet
- Right Click
- Choose Paste



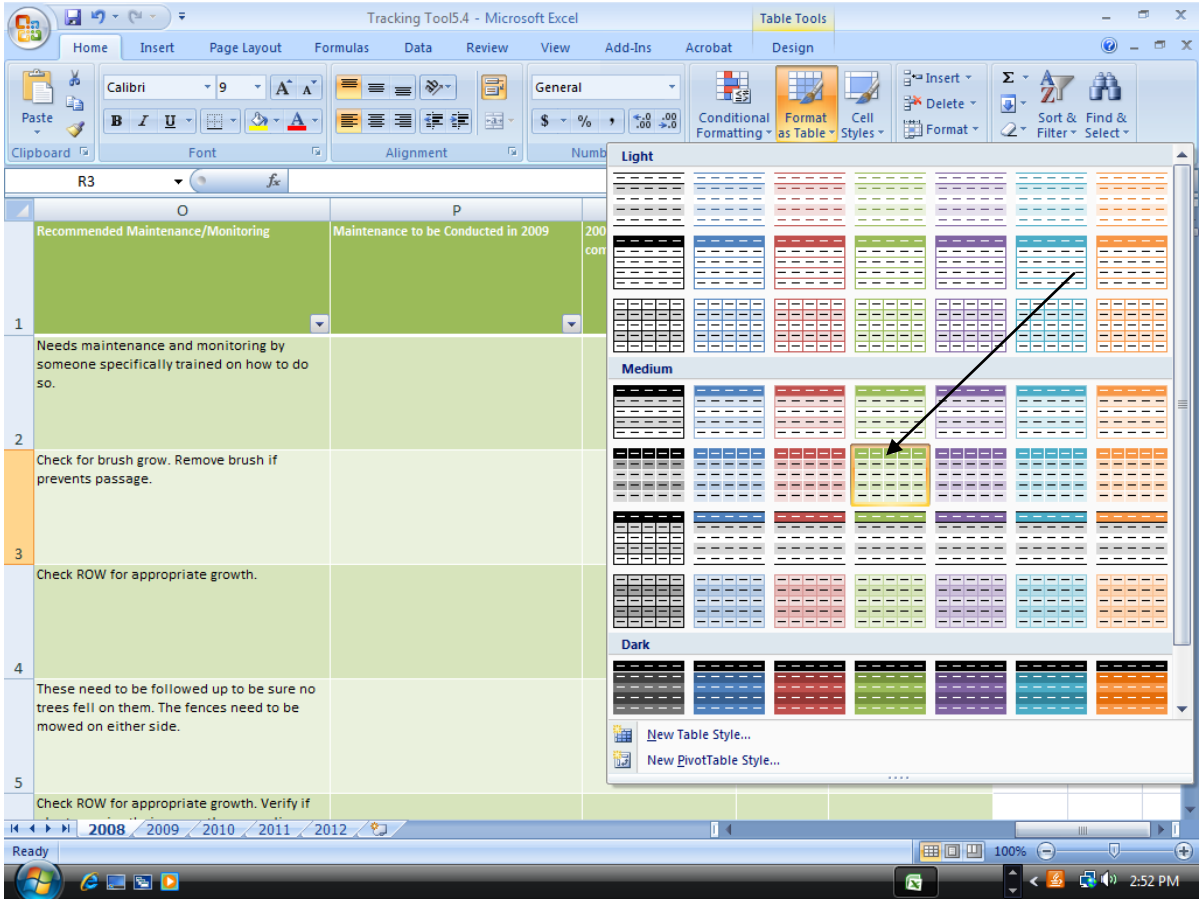
Each worksheet tab is labeled chronologically by year. Use only one spreadsheet per year.

If the user needs to extend the Colored Formatting to accommodate more rows of environmental commitments:

Select the number of rows to be use by highlighting the spreadsheet across columns A-S, down to the number of rows the user wants to use.

From the “Home” tab, choose “Format As Table”

Select the green colored table which is the 5th option, vertically.



Implementation

In July, 2009, the project literature review, project final report, tracking tool, and User's Guide will be made available electronically to WisDOT Environmental Coordinators and BEES staff.

Staff will be able to begin using the tool immediately, as no additional software or significant training should be necessary due to staff familiarity with Excel.

A copy of the project final report, Microsoft Excel tracking tool, and User's Guide will be available online at www.wistrans.org in electronic format to assist in use of the tracking tool.

Report Submission:

- Reports should be submitted by WisDOT Environmental Coordinators to the Chief of the Environmental Services Section at WisDOT BEES on January 1 of every year. The report should consist of the previous year's tracking tool worksheet for environmental commitments in the Region. Prior to sending the report the worksheet should be checked for consistent entry of sort-able column data such as County Name, Region, and Category ID.

- A staff person appointed by the Chief of Environmental Services at WisDOT BEES will combine the reports from the Regions in order to have a unified WisDOT inventory of current ongoing environmental commitments.

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C. Inventory

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
WI- 63	NE			H	Aquatic Habitat	Fish crossing	Fish crossing was created for fish passage of perched culverts. Special resting zones were created in culverts using specially designed inserts in the culverts.	Needs maintenance and monitoring by someone specifically trained on how to do so. Check for correct placement of inserts and condition of fish resting spot devices.
US- 141	NE	Oconto	An un-named tributary and Beaver Creek	W	Wildlife Crossing Structure	Crossing for mammals	Bridge extensions built in order to allow for crossings underneath bridge.	Check for brush growth. Remove brush if prevents passage of large mammals. Check for erosion of slopes that may make underpass impassable.
US- 10	NE	Outagamie	US 10 Freemont to US 45	H	Habitat	Habitat for roadside wildlife	Special seed mixtures to enhance the roadside wildlife habitat value.	Check ROW for appropriate growth. Verify if plants survive their warranty as supplier may be responsible for plantings.
US- 41	NE	Oconto and Marinette	Oconto to Peshtigo	H	Habitat	During construction, cleared and graded areas will be seeded or sodded. Where appropriate, re-vegetation will be done using special seed mixtures for a particular area in consultation with the DNR.	Where appropriate, re-vegetation will be done using special seed mixtures for a particular area in consultation with the DNR.	View ROW to verify grassy vegetation and wildflowers exist. Check for invasive species. Follow best practices for enhancing this type of environment and invasive species removal.

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
US- 141	NC	Marinette	STH-22-STH-64 (Lamere RD to 6th RD)	H	Habitat	Mitigation for upland habitat disruption includes replacement of disturbed vegetation within a ROW under the Wisconsin Standard specifications for Road and Bridge Construction.	Native species seed mixtures should be used along the roadside. Area will be seeded or sodded. Re-vegetation measures will minimized upland habitat loss. It is anticipated that the habitat will return after construction is completed.	Check ROW for appropriate growth. Verify if plants survive their warranty as supplier may be responsible for plantings. Follow best practices for enhancing this type of environment and invasive species removal.
US- 10	NC		East and West between Stevens Pt and Waupaca	W	Wildlife Crossing Structure	Wildlife protection	There was short fencing put up to prevent turtles from crossing the highway. The first year, this worked great- in following years the grass grew up and fell over the fences, creating a turtle ramp, allowing the turtles to access the highway again, resulting in turtles loss.	Check for damage incurred from cars or falling branches. The fences need to be mowed on either side in coordination with turtle mating cycles.
US- 10	NC			H	Habitat	Habitat for Red Shoulder Hawk	There is a new alignment that encroaches on prairie check and Red Shoulder Hawk habitat- they are looking for a parcel that could be that type of habitat- but are having trouble finding one- as there are no willing sellers.	Check annually for possible purchasable lands to maintain as habitat.

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
US- 10	NC		Eastern Segment	H	Habitat	Grassland development in ROW	Mowing should be coordinated with Invasive Species Management programs, and minimized in order to encourage a grassland environment.	Check ROW for appropriate growth. Verify if plants survive their warranty as supplier may be responsible for plantings. Follow best practices for enhancing this type of environment and invasive species removal.
WI- 36	SE		Near Burlington	W	Wildlife Crossing Structure	Crossing for turtles	"Day-lighted" culverts for crossing and funnel fencing were placed as ecopassages for Blanding's Turtle habitat connectivity.	The funnel fencing needs to be checked- possibly mowed along or restored if branches or anything else has fallen on the fencing. The culverts may need to be cleaned out in order to allow for passage by animals and light penetration of culvert. Monitoring should be conducted to verify use of passages.
Various Locations	NC			W	Wildlife Crossing Structure	There have been numerous close calls with Elk on the road. This feature is to alert drivers that Elk are near the road in the vicinity.	Elks in the heard were fitted with radio collars that are paired with flashing lights on the roadway that flash when they pick up a signal that elk are nearby.	Significant maintenance needs to be conducted to verify all of the parts are working. The photo-voltaic cells need to be brushed off when it snows. Back up batteries are in the packs, but they may run out so maintenance should be conducted in a timely fashion.
WI- 57	NE	Door	Over the Anapeh River	W	Wildlife Crossing Structure	Extended bridge	Bridge extensions built in order to allow for crossings underneath bridge.	Check for brush growth. Remove brush if prevents passage of large mammals. Check for erosion of slopes that may make underpass impassable.
Various Locations				H	Habitat	Mussel Habitat	Endangered Mussels are often relocated from Bridge project area-often they are relocated downstream or into better habitat.	Monitoring of mortality/loss is necessary following relocation.

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
WI- 131	SW			W	Wildlife Crossing Structure	Extended bridge	Bridge extensions built in order to allow for crossings underneath bridge.	Check for brush growth. Remove brush if prevents passage of large animals. Check for erosion of slopes that may make underpass impassable.
WI- 131	SW			W	Wildlife Crossing Structure	"Critter passes"	Small breaks in roadway wall to allow for small animal passage across roadway.	Check for overgrowth of passes, monitor for use to monitor for effectiveness.
WI- 49				W	Wildlife Crossing Structure	"Critter passes"	Culverts were placed in the roadway in order to allow for safe passage.	Ducklings and gosling were attempting to use the pass and minks would prey on them in the tunnels. Monitoring and clog removal are both needed. Possibly plant brush to provide cover at entrances.
US -41	NE	Oconto	Oconto to Peshtigo	H	Aquatic Habitat	Aquatic Species Movement/Habitat	Culvert: In an attempt to minimize impacts to fish and other aquatic species in streams being impacted by the project, WisDOT has agreed with DNR and FWS to install roadway cross drains so that the V-11 flow-lines will be 6 to 12 inches lower than the adjacent streambed. This will allow the bottoms of the culverts to silt in with native material, resulting in a natural bottom. This method also ensures that there is adequate depth for aquatic species to traverse through the culvert.	Needs maintenance and monitoring by someone specifically trained on how to do so. Check for correct placement of inserts and condition.

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
WI-26	SE/SW border			H	Habitat	The USEPA has expressed concern about the indirect effects of storm water runoff from the Preferred Alternative on sensitive water bodies, especially near the Storr's Lake Wildlife Area (see February 2, 2004 comment letter in Section 7.3).	WisDOT is committed to minimizing such impacts. WisDOT will establish a 200-500 foot buffer zone near Storr's Lake Wildlife Area, and will commit to implementing the following EPA recommendations: • The use of a two-cell sedimentation basin system designed to filter larger and finer particles; • The use of native vegetation in the sedimentation system. It is anticipated that any buffer zone created near the Storr's Lake Wildlife Area will remain in public ownership and will be maintained by the responsible public agency.	Check sedimentation systems to verify systems are effective. Check for needed maintenance including cleaning debris removal. Note comments on agency responsible for maintenance.
I94 SE	SE			H	Habitat	Concern over habitat of Blanding's turtle and Eastern Mississauga rattlesnake	Ecopassage installation.	The funnel fencing needs to be checked- possibly mowed along or restored if branches or anything else has fallen on the fencing. The culverts may need to be cleaned out in order to allow for passage by animals and light penetration of culvert. Monitoring should be conducted to verify use of passages.

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
I94 SE	SE			H	Habitat	Ecopassage	Underpasses or other movement devices will be constructed at the four locations where snake habitat is found on both sides of the highway.	To determine whether preservation measures are successful, WisDOT will monitor Butler's garter snake populations 3 years and 5 years following construction.
Various Locations				W	Wildlife Crossing Structure	Deer	Signage regarding deer habitat in proximity to roadway.	Verify condition of signage. Check for vegetative growth which may cover signs.
MILWAUKEE-MADISON PASSENGER RAIL CORRIDOR PROJECT	SE	Dane-Milwaukee		H	Habitat	Native Species Plantings	In order to restore specific prairie remnants disturbed during construction, native seed mixtures will be included in contract special provisions.	Check ROW for appropriate growth. Verify if plants survive their warranty as supplier may be responsible for plantings. Follow best practices for enhancing this type of environment and invasive species removal.

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
WI- 16	SE	Jefferson	OCONOMOWOC BYPASS (ROCK RIVER TO STH 67)	W	Wildlife Crossing Structure	An underpass is needed for deer and other small mammals. The likely place for the pass is at the creek.	The underpass, in conjunction with deer fencing will be provided to link severed wildlife habitat of the Saeger Creek Complex.	Slope maintenance is often problematic because of the need to maintain a built-up fill section for an elevation that provides for a smooth transition into the bridge while maintaining suitable conditions for animal movement under the bridge. Slope stabilization with headwalls, riprap, reinforced earth, or vegetation can greatly reduce maintenance frequency, expense, and disturbance to the wildlife underpass. It is important that cover for animals be a consideration in the maintenance plan for the structure. If organisms sensitive to the need for cover are to use the structure, maintenance of sufficient cover will be required. Research from Europe has indicated that cover, such as rows of debris under the crossing, can facilitate small mammal and reptile/amphibian movement under the crossing. To assure visibility of the crossings for animals, vegetation control is the primary maintenance function for these structures. Therefore, it may be necessary to size structures so that mowers can move through the underpass and the area in and around the structure. Graffiti and vandalism are also maintenance problems in areas that have access to humans. (Center for Environmental Excellence)

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
WI-16	SE	Jefferson	OCONOMOWOC BYPASS (ROCK RIVER TO STH 67)	H	Habitat	Habitat maintenance and enhancement: Roadside ROW and medians will be managed through infrequent mowing, planting of grassy vegetation and wildflowers, in order to provide small mammal habitat.	Roadside ROW and medians will be managed through infrequent mowing, planting of grassy vegetation and wildflowers, in order to provide small mammal habitat.	Infrequent mowing needed. Follow best practices for enhancing this type of environment and invasive species removal.
US-51	NC	Marathon	Rib River by Wausau (51- 4 different bridges)	W	Wildlife Crossing Structure	Modified Bridge Underpass to allow for small animal crossing.	Where large boulders would typically go all the way down to a stream bed in construction, now they are laying moss-stone or large gravel of some sort on the banks in order to provide a level passage under bridge for small animals and turtles.	Check to see if spring waters washed out the gravel banks. Check to see if a level area exists for small animal passing about the water line. Check for erosion of slopes that may make underpass difficult to cross.
WI-23	NC	Marquette	State Hwy 23, (Montello near Cty M) near Hawks Creek	W	Wildlife Crossing Structure	Modified Bridge Underpass to allow for small animal crossing	Where large boulders would typically go all the way down to a stream bed in construction, now they are laying moss-stone or large gravel of some sort on the banks in order to provide a level passage under bridge for small animals and turtles.	Check to see if spring waters washed out the gravel banks. Check to see if a level area exists for small animal passing about the water line. Check for erosion of slopes that may make underpass difficult to cross.

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
WI-54	NC		54 over Yellow River near Wisconsin Rapids	W	Wildlife Crossing Structure	Modified Bridge Underpass to allow for small animal crossing	Where appropriate, re-vegetation will be done using special seed mixtures for a particular area in consultation with the DNR.	Check to see if spring waters washed out the gravel banks. Check to see if a level area exists for small animal passing about the water line.
Unknown	NC			W	Wildlife Crossing Structure	Perched Culverts-Trout culvert crossings	Trout cannot get into these culverts when they go upstream. 1-2 stream culverts were put in wrong and need to be fixed to allow for spawning -now these culverts have little insertions in them which are shaped like an “s” which create “rest stops” so the fish can get in, and make it the distance when water is flowing too fast in the culvert. These need to be checked to see if they wash out. Some culverts have stream simulation-where rocks and stones are placed in the bottom, and they are set below the stream bed- in the Northern part of the region	Needs maintenance and monitoring by someone specifically trained on how to do so. Check for correct placement of inserts and condition.
WI- 83	SE	Racine		H	Aquatic Habitat	Ecopassage	The Pickerel Frog, a state-listed special concern species, is known to occur in wet areas in the Genesee Creek system. Provide for habitat movement corridors.	

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
WI- 83	SE	Racine			Wildlife Crossing Structure	Ecopassage	Ecopassages are part of a specific conservation plan for the Blanding's Turtle would be developed during a future engineering phase in consultation with the DNR to minimize effects on essential habitat and to conserve this species.	Monitoring- To ascertain whether preservation measures are successful, WisDOT would monitor Blanding's Turtle populations 3 and 5 years following construction. This would consist of repeating the protocol used during the initial survey to determine whether there have been any substantive changes in Blanding's Turtle populations at the three movement corridor locations.
WI-11	SE	Rock	Janesville Bypass	H	Habitat	Upland Habitat	Use native seed and grass mixes in ROW	Mowing should be conducted under current WisDOT mowing policy.
WI-11	SE	Rock	Janesville Bypass	W	Wildlife Crossing Structure	A wildlife crossing will be installed as a result of 2001 Herptile Assessment Report	Crossing may have been placed as ecopassages for habitat connectivity.	If fencing was used it needs to be checked- possibly mowed or restored if it has fallen, or if branches or anything else has fallen on it-the culverts may need to be cleaned out. Monitoring should be conducted to verify use of passages.

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
US -12	SW	Dane		H	Habitat	Wildlife Habitat Vegetation	ROW should be re-vegetated to enhance wildlife habitat value.	A specific conservation plan for the Blanding's Turtle would be developed during a future engineering phase in consultation with the DNR to minimize effects on essential habitat and to conserve this species.
US -10	SW	Portage/Wood	Wood County B to WIS 34 South	W	Wildlife Crossing Structure	Critter passes	Critter passes of unidentified nature in environmental documents. May be openings in the roadway wall or possibly a culvert.	Monitor for use. Check if brush needs to be remove or culverts cleaned out if passes are culverts as opposed to opening in road wall.
US-10	SW	Portage	Marshfield-Waupaca	W	Wildlife Crossing Structure	Fencing, culverts, stream banks	Fencing for Wood and Blanding's Turtles along Hwy 10. Stream overpasses to be constructed with spans long enough to allow a riparian corridor along the stream bank to allow turtles to cross under the highway and replacing existing culverts with open bottomed culverts.	Fences may be damaged, check fencing and repair if necessary. Culverts may be clogged, clean if in excess. Verify a riparian bank still exists for turtle passage.
County J	SE		WIS 164 Corridor Study(I-94 to County E)Waukesha and Washington Counties, Wisconsin	W	Wildlife Crossing Structure	Crossing for Butler Gardner Snake	Underpasses or other movement devices will be constructed at the four locations where snake habitat is found on both sides of the highway.	To determine whether preservation measures are successful, WisDOT will monitor Butler's garter snake populations 3 years and 5 years following construction.
Trestik RD and I39/US 51 CTH K		Portage		W	Wildlife Crossing Structure	Turtle fencing, stream overpasses, culverts	Fencing for Wood and Blanding's Turtles along Hwy 10.	Fences may be damaged, check fencing and repair if necessary. Culverts may be clogged, clean if in excess. Verify a riparian bank still exists for turtle passage.

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
WI- 57	NE	Door		C		There was a traditional cultural property of the Menominee that was going to be affected by the roadway-but not affect any significant sites.	In order to mitigate the affect, a display was made regarding the importance of Sturgeon to the Menominee Tribe, which circulated through different public display locations, and is currently in possession of the tribe.	No further maintenance needed. (Delete from the next years spreadsheet).
WI-60	SE	Richland		C	bridge	Replacement of historical bridge	WisDOT used a stone liner to make a new bridge look like an older stone bridge.	No further maintenance needed. (Delete from the next years spreadsheet).
Unknown	SW	Richland	Site of John Coombs Residence	C	Historical Landscape preservation and View Shed Maintenance	The John Coomb historical landmark in Richland County has a surrounding landscape maintained to look as it did 150 + years ago.	WisDOT had to replace a box culvert on the roadway there- in order to meet view-shed requirement WisDOT hid the rip-rap, spread appropriate seed, and planted seedling to restore the landscape of the 1800's.	Check plantings to verify survival. Monitor for invasive species.
Cty- A	SW	Sauk	Roadside along Lake Delton, HWY A, at the Vanderpol Homestead	C	Historical Landscape preservation and View Shed Maintenance	Protection and landscape maintenance of The Captain Vanderpol Homestead.	The Captain Vanderpol Homestead is near the area where Hwy A failed. It is being built higher to act as a more effective dyke so that Lake Delton cannot overflow again. The new embankment will end on Captain Vanderpol lands but will not impact the house..	Trees should be monitored.

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
Cty- A	SW	Sauk	Roadside along Lake Delton, HWY A, at the Vanderpol Homestead	C	Historical Landscape preservation and View Shed Maintenance	Protection and landscape maintenance of The Captain Vanderpol Homestead.	WisDOT will create a marker to commemorate the 2008 flooding.	Verify marker is installed.
US- 41	NE	Oconto	Oconto to Peshtigo	C	Historical Landscape preservation and View Shed Maintenance	The character and quality of the view shed will be affected to some extent by widening USH 41 to a4-lane facility between Oconto and Peshtigo and constructing the 4-lane bypasses around Ocontoand Peshtigo. Travelers on the new roadway and those with a view of the new roadway fromadjacent properties will experience a change in their visual environment.	Impacts to the Viewshed can be addressed by various techniques such as: enhance or create views where possible through horizontal and vertical alignment design and/orselective clearingDesign horizontal and vertical alignments to complement the existing terrain.Incorporate landscape planting to frame views, replace vegetation lost during construction,screen unsightly views, and provide visual variety Re-vegetate the slopes with shrubs to heal the scars more quickly.Preserve the existing vegetation as much as possible	Check ROW for appropriate growth. Verify if plants survive their warranty as supplier may be responsible for plantings. Follow best practices for enhancing this type of environment and invasive species removal.
US -41	NE	Oconto and Marinette	Oconto to Peshtigo	S	Water Quality	Filter strips and Swales	Maintenance of water quality and vegetation management.	Maintain filter strips and swales to prevent woody growth and promote dense vegetation. Remove debris and sediment build up from collection type devices.
US-41	NE	Oconto and Marinette	Oconto to Peshtigo	S	Water Quality	Culverts for storm water management	Culverts installed	Culverts may need to be cleared out to prevent damming.

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
US- 141	NC	Marinette	STH-22-STH-64 (Lamere RD to 6th RD)	S	Stormwater Management	Culverts for storm water management	Culverts for storm water management should be constructed so that the flow line is 12 inches below the stream bed.	Check culverts for cleaning
US- 53	NW		Expressway	W	Threatened and Endangered Species	Trans-located colony of threatened and endangered plants	Threatened and endangered plant species- translocations- a few projects have taken place over the years where a threatened and endangered plant colony has been in the project area- and the colony is replanted to another area.	There is a need for monitoring and follow up on these colonies. Check ROW for appropriate growth. Verify if plants survive. Follow best practices for enhancing this type of environment and check for invasive species.
US -53	NW			W	Threatened and Endangered Species	Wolf Crossing	Bubbled highway lanes allowing for a large median which facilitates wolf crossings.	Radio telemetry that has been conducted suggests there have not had many kills- it is basically working and animal behavior indicates that it is successful. Continue to monitor wolf-car collisions.
US- 53	NW			L	Wetland	Road relocation- agreed to be moved at time resurfacing needed.	Agreement to relocate road after additional life of pavement was captured or by 2010.	Tracking of commitment to allow for correct agreement follow-through.

Roadway	Region	County	Specific Location	Category ID	Feature Category	Feature Description	Environmental Commitment	Recommended Maintenance/Monitoring
Fox Isle Drive Bridge	SE	Racine	Near Village of Waterford, Fox Isle Drive Bridge over Fox River.	H	Habitat	Threatened and Endangered Species Habitat	A new bridge was placed in the SE Region near the Village of Waterford, as part of the DOT Local Roads project. DOT had commitment to monitor the river as there was a concern it would limit spawning habitat for state threatened fish. DOT had commitment to see if new structure in the river was going to cause scour that would cause unexpected loss of spawning habitat.	Specialist estimated if there were to be a problem would be a problem it would become apparent fairly soon. Monitoring is recommended for the first 3-4 years. (Scour means that when a stream bed has a gravel bottom, it can pick up that gravel bed-load and transport it downstream).
US- 151	SW	Columbia	Portage, in the Duck Creek Corridor, where 51 crosses the creek.	W	Wildlife Barrier	Turtle Wall	No specific details were provided about the type of barrier used.	Fences may be damaged, check fencing and repair if necessary. Mow along fencing if vegetative growth is diminishing effectiveness of fence.
WI- 26	SE	Jefferson		S	Stormwater Management	Infiltration Trench	Infiltration Trench	Infiltration Trenches need to be monitored. If there is standing water they are not working appropriately and need to be cleaned.
US-151	SW	Dane	near Verona	H	Habitat	Invasive Management: Crown Vetch	Spraying of Calico which was given as a free sample. This seems to be working and may need follow up maintenance and monitoring for the Crown Vetch.	See DNR maintenance recommendations from Crown Vetch removal case study.

D. Literature Review

Literature Review: State of the Practice of Tracking Environmental Commitments.

Wisconsin has constructed many environmental mitigation projects in conjunction with transportation projects that have been implemented pursuant to the National Environmental Policy Act. Other mitigation projects have been constructed pursuant to discussions and negotiations with Wisconsin Department of Natural Resources. These mitigation projects offset or replace a certain environmental function(s) lost as a result of construction of the transportation project. Examples include storm water management facilities, stream restoration projects, reforestation projects, construction of sound walls, cultural and historical markers and displays, replacement of parklands and wildlife crossing structures.

In order for the environmental mitigation projects to continue to provide long term functionality intended when they were first constructed, they must be properly maintained, and when necessary, rehabilitated or reconstructed. These environmental mitigation projects should be considered as assets similar to other transportation features.

Wisconsin DOT (WisDOT) has identified the need for better understanding the costs of selected features in the overall scheme of project development and ongoing maintenance. Creating an inventory of projects including cultural resources and wildlife accommodations is of particular interest at this time and is detailed throughout this project.

The purpose of this review is to provide information regarding the state of the practice in other states and municipalities for collecting and tracking environmental commitments. Currently, nearly all agencies' environmental commitment tracking taking place is during construction, not for maintenance and monitoring of ongoing environmental commitments after completion of a project. Nevertheless, there are sufficient lessons to be learned from existing systems and tools. No state has exhibited a stand-alone or integrated tracking system for ongoing commitments; however, several states have exhibited components of such a program. Several states, such as Oregon and Washington, have

suggested that they plan to develop a tracking system for ongoing environmental commitments or to incorporate such monitoring and maintenance issues into existing management systems.

This review is organized according to the types of tools utilized by states for commitment tracking and will also investigate procedural activities utilized to enhance tracking.

1. A Review of Existing Tools

The tools utilized by other state agencies range from simple spreadsheets and checklists to specialized databases, advanced web-based systems capable of producing reports and notifications and systems that utilize GIS and other mapping systems to assist in data analysis and site location. Additionally, a number of other practices integrate and incorporate environmental commitment management into plans, bids, and contracts. This review considers other state and municipal experiences with the advantages, limitations, and lessons learned from different tools.

The review concludes with a listing of common features identified as useful aspects of agency environmental commitment management tools. To attain the goals and objectives of this project, many of these features will be included in the tracking tool and inventory.

An emerging objective for this type of environmental commitment, monitoring and maintenance processes are still being developed, the bulk of the literature regarding environmental commitment tracking tools discusses tracking processes and tools used during construction, not post-construction. Nevertheless, valuable lessons can be learned from tools in use, and systems and processes can be adapted for post-construction maintenance and monitoring.

A. Spreadsheets

As discussed in the *National Highway Cooperative Research Program, NCHRP 103*[1] and the *FHA Domestic Scan*[2], and *Benchmarking State DOT Environmental Commitment Tracking Systems*[3], a number of state agencies are utilizing spreadsheets and checklists to track commitments during construction. These may be fairly detailed and made accessible and interactive online in order to facilitate communication.

The majority of the spreadsheet tools reviewed do not identify cost information, and many projects do not tend to have the costs of the mitigation projects separated from the general construction costs. By separately identifying and listing these costs from other project costs they could be tracked and aggregated for later analysis in order to better understand the cost implications of integrated environmental commitments.

Some spreadsheets and project management databases, such as that of the Illinois DOT, integrate by using the same project and contract numbers.

The *Transportation Synthesis Report* describes California's spreadsheet tracking tool, the Environmental Commitment Record (ECR)[4]. California is currently using two Excel spreadsheets for tracking mitigation projects: a Mitigation Monitoring and Reporting Record (MMRR), and a Permit, Agreement and Mitigation form (PAM). [5] They can be viewed in the appendix of this report.

Advantages:

- The ECR-style Excel based spreadsheets would be a reasonable option for creating low-budget, easy to use data collecting tools.
- The spreadsheet tools have minimal software requirements-therefore low overhead.

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[1] NCHRP Web-Only Document 103
[2] FHA Domestic Scan
[3] Benchmarking State DOT Environmental Commitment Tracking Systems, TRB 2007 Annual Meeting CD-ROM,
Marie Venner, Brian Allen, Mark Youman, Mike Barylski and Michael DeWit
[4] Environmental Commitments Record
Memorandum from Richard Land, Caltrans Chief Engineer, to deputy district directors for Construction, Design, Environmental and Project Management, June 2005
[5] Ibid

- The forms provide detailed information regarding the project details, timeline, meetings, biological features, and whether or not the compliance requirements have been met.
- The MMRR form (Excel Spreadsheet) has a personnel listing which may help to increase communication and information flow amongst involved/responsible parties.
- The forms lay out a display of who is the responsible party for which actions during construction, which may help with ownership and follow-through on projects.
- The PAM form (Excel Spreadsheet) provides a detailed summary of permits and environmental commitments that must be incorporated into the PS&E, responsible parties, and timing of activities.

Limitations:

- The forms are not interactive, will not serve as the "ringing phone" to demand attention and notify staff of necessary actions such as permits requests, submissions or other communications.
- Minimal detail exists regarding follow up timelines and maintenance. For example, the spreadsheet notes that Caltrans will have a quarterly follow up by a project biologist- but if there is a change of employees will this information be revisited? When and how does the project biologist receive and track this responsibility? To this degree an electronic record is of little more use than a paper file. Ultimately, reports and notifications should be the next step in the development of any program. In lieu of a notification system the user could possibly systematically search for "due dates" or actions required.
- Access to documents: Forms are to be in the California Uniform File System for hard copies. A copy is to be retained in the project history file.[6] Also, each district is responsible for identifying the party responsible for preparing and updating the ECR. These hard copy forms may have limited access/use unless integrated with a larger enterprise system.
- Updating the files may also be an issue if there is not a clearly defined maintenance schedule.
- Employee turnover may also limit the effectiveness of such reports.
- Current literature focuses on processes and procedures for recording current and future environmental commitments, but none have discussed collecting data on past projects or future operations for maintenance.

[6] Environmental Commitments Record
Memorandum from Richard Land, Caltrans Chief Engineer, to deputy district directors for Construction, Design, Environmental and Project Management, June 2005

Lessons Learned: The spreadsheet is a good start for a beginning CTS, which could later have the data exported into an expanded Environmental Management System or integrated into a GIS application, such as a Commitment Tracking Tool for Wisconsin. Appropriate data should be recorded which can provide attribute data for GIS use including:

- Specific GPS location/coordinates
- Responsible agency, county, and WisDOT region.
- Maintenance and monitoring required
- Date of maintenance and monitoring activities
- PDF copies of MOU and other inter-agency agreements

The literature review has shown that a primary challenge of the CTS spreadsheets has been user error, lack of systematic use, or that some staff are not using the electronic CTS at all. Any new system of tracking should be mandated, but more importantly-useful to those inputting and retrieving data- it should be tailored to the needs of the regions so that the tool is appropriate for the people using it. [7] Therefore, in creating a CTS, each level of staff should be interviewed within the regions in order to understand what their job is and how their job is accomplished in order to create a tool useful to its users and management.[8] Also, if a spreadsheet is used as the tracking tool, it should be simple and easy to use, data input should be minimized so that significant duplication of data entry is not occurring.

B. Checklists and Forms:

The NCHRP-103 notes that numerous agencies identify a successful strategy to follow through with environmental mitigation projects during construction is to incorporate green sheets or similar documents referencing environmental commitments into the overall project plan[9]. Additionally, several agencies note the use of checklists for engineers or construction managers to refer to in order to assure that the environmental commitment is communicated and constructed.[10] The NCHRP Report 103 reports that Indiana developed a

[7] Benchmarking, p. 5-8
[8] Asset Management Systems for Roadway Safety, FHA p.15-16
[9] NCHRP Web-Only Document 103, p. 2-5
[10] NCHRP Web-Only Document 103, pp.A-5-7

"Scope/Environmental Compliance Certification/Permit Application Certification" checkpoint at four design stages in order to verify that the design has included all environmental commitments.[11]

Agencies in Maryland, New York, and Texas also use checklists as part of their asset management system. [12]

As described in the AASHTO Practitioner's Handbook, it is beneficial to include a summary of environmental commitments in the Environmental Impact Statement and Record of Decision.[13] This list may simplify the data entry of environmental commitments into the tracking tool. The list should include a checkbox that signifies that the commitments will need maintenance or monitoring after construction.

Advantages:

- Simple format, user friendly
- Establishes consistency in environmental practices
- Easily integrated into a structure system
- Simple way of communicating actions and responsibilities.

Limitations:

- Checklists need to become an integrated part of the process
- A system or ethic must be in place to assure use of the checklist
- If only in hard copy access is limited
- Must be filed or placed appropriately

[11] NCHRP Web-Only Document 103, p. A-4
[12] NCHRP Web-Only Document 103, pp.A-5-11

[13] AASHTO Practitioner's Handbook, p. 4

Lessons Learned:

A checklist or form can be a very useful tool for centralizing important data or certifying certain activities have taken place. Their use and filing must be consistent in order to develop reliability. Wisconsin should consider using a standardized Environmental Commitment Tracking Summary Form for all of its projects. This form should be included at the front of all environmental documents and in project plans. At the close of the project, environmental commitments noted on this form that need ongoing maintenance or monitoring should be added to the Wisconsin Environmental Commitment Tracking Tool.

C. Specialized Databases for tracking

NCHRP 103 details that a common tool for tracking is the specialized database. Agencies in Colorado, Illinois, Montana, and New York are using specialized databases as are Washington State DOTs and the Pennsylvania Turnpike Commission.[14] A number of states have developed mechanisms to track costs associated with environmental mitigation. These databases may vary depending on numerous factors of the agencies needs, budget, and available technology.

Furthermore, certain traits are important in creating a database. These include system compatibility, appropriate database fields, and the use of data entry forms. Database fields which are recommended include:

- Description of the commitment
- Subject
- Responsible Party
- Assigned Contracts

[14] Transportation R Synthesis

- Source Documents
- Status
- Due Date/Timeline[15]

These data points remain specific to tracking systems. They also must relate to maintenance and monitoring of environmental commitments. The database should also be designed to facilitate "coordination with operations and maintenance staff" for "commitments that extend beyond design and construction."[16]

Examples:

Arizona
Tracking Costs and Features:
According to Arizona DOT's Environmental and Enhancement Group, they have a limited but growing capacity to track some environmental mitigation costs incurred by the agency during project delivery. Arizona has a centralized database that "retains information regarding the number of projects, responsible staff, due dates, and concerns and current status for each specialty."[17] This agency does not have a system for tracking ongoing maintenance and monitoring of environmental commitments.

Cultural Resources:
ADOT's assessment documentation of cultural resources include the Consultation Initiation Form, which states preliminary findings, survey reports which document findings from on-site surveys, and Memorandum of Agreements, that document specific mitigation actions for sites that cannot be avoided. There are also guidelines which provide information to help archaeologists conduct cultural resources investigations that meet state and federal law and regulations. [18]

[15] AASHTO Practitioner's Handbook, p. 4
[16] AASHTO Practitioner's Handbook, p. 4
[17] 2003, EE&G
[18] http://www.adotenvironmental.com/cultural.asp

California

California is developing and organizing statewide information on environmental mitigation needs in conjunction with identification of mitigation or environmental enhancement opportunity areas. Summaries of integrated mitigation needs and plans will be developed by region, covering a 10-year period. The project will investigate past Caltrans mitigation projects to summarize outcomes and to compare costs. Existing programmatic agreements and mitigation/conservation banks available to Caltrans will be identified and linked to geo-referenced needs, and Caltrans' existing BioMitigation database will be improved.

Illinois

Illinois has developed a database for monitoring projects which tracks the status of biological and cultural resource surveys. This database would be a model to consider since it not only includes tracking but commitment collection by using Electronic Environmental Survey Request Forms. As reported in the NCHRP Report 103 these forms have standardized data elements and are completed on-line by District Offices. They are accessible by external users, so the information collected can be shared and utilized. This agency does not have a system for tracking ongoing maintenance and monitoring of environmental commitments.

Indiana

Indiana has developed an electronic project tracking system, from which a commitment summary was created. This summary is incorporated into the NEPA documents and project plans and has shown results of more complete implementation of environmental commitments. Indiana has several different incorporated systems in place that work well-tracking, summary, incorporation into plans, and a GIS system being developed to be discussed below. [19] This agency does not have a system for tracking ongoing maintenance and monitoring of environmental commitments. The consistent use of a commitment summary in environmental documentation would assist WisDOT Environmental Coordinators and staff identify environmental commitments that should be tracked for ongoing maintenance or monitoring. This agency does not have a system for tracking ongoing maintenance and monitoring of environmental commitments.

Kentucky

In 2005, as part of a commitment tracking system called "Communicating All Promises," the Kentucky Transportation Cabinet introduced 22 new activity codes for use by environmental staff and a comparable set of 22 codes for tracking consultant activity that are expected to improve the agency's cost tracking capabilities and tracks all agency commitments through all phases of project development and implementation. "The CAP tracks and demonstrates follow through on all commitments made from planning through construction and maintenance. Commitments are

[19] NCHRP Web-Only Document 103 p.A-4

posted in the State's online tracking system for use by contractors and placed in the lead project engineer's files. The approach institutionalizes commitments made by the agency and improves communication among all parties involved in the transportation process, increasing efficiency.

"KYTC's Guidance Accountability Form (GAF) for all environmental base studies and impacts and mitigation commitments from that document and NEPA are summarized in the Project Impact Profile (PIP), which both feed into KYTC's CAP system. Promises are accumulated in KYTC's PRECON database system, which allows entry of a description of the promise, to whom the promise was made, documentation, and the date of the promise. The Project Manager enters the promises from the planning report into the PRECON-CAP system and remains the keeper of the CAP for each individual project. All subsequent project promises are then communicated to the Project Manager and endorsed by the Project Team. The Project Manager retains the responsibility for ensuring that all promises (roadway features, environmental, right-of-way, utilities, structure design, etc.) are ultimately brought to reside in the PRECON CAP. A report function is included in the CAP system, which is run and included in the documents submitted to PS&E for letting, in the bid package, and in the contract document. The ledger of commitments enables tracking of commitments through all phases from planning through construction and maintenance."[20]

Maryland

SHA staff time and preconstruction consultant activities are tracked using the agency's Financial Management Information System. Maryland has used Oracle and MicroSoft Visual Basic which will all be pulled into one GIS platform using Oracle. Maryland is also using Access for some major projects.

Montana

Montana DOT maintains a database to track the costs of its mitigation projects, but not specific maintenance and monitoring. Cost items include NEPA evaluation, engineering/design, right-of-way (property) acquisition, acres and cost per acre.

Oregon

Elements of Oregon DOT's cost tracking methodology include planning costs, preliminary engineering/environmental costs, right-of-way costs, design costs, construction costs and maintenance costs. This agency does not have a system for tracking ongoing maintenance and monitoring of environmental commitments but plans to develop such a system.

Washington

WSDOT also created a database for tracking construction site erosion and sedimentation control risk, requirements, commitments and performance. Further tracking systems of WSDOT are discussed below.

[20] AASHTO Center for Environmental Excellence Online Compendium Manual

Advantages:

- The most useful databases are those that allow for system expansion and those which require data to be entered in once.
- The most useful systems are integrated with other databases, have accessible data, report functions, notification functions, and track internal compliance. [21]

- An ideal tracking system is detailed and able to generate reports and aggregate information in order to provide useful analysis regarding costs and best practices. An advantage of this system is the separate identification of consulting costs and identification and tracking of cultural resources.

- Specialized databases are useful in that they can be created to specifically cater to the needs of any particular agency.

Limitations:

Challenges include: making all of the information accessible within and between agencies and having the databases be more than an electronic filing system- one which can provide updates, reports, and notification of necessary actions.

- Systems and data need to be user friendly.

- The review has shown that some databases are sufficient for collection but questionable in value as a source for producing reports, or integrating with other systems.

- Staff needs to be adequately trained and willing to use the new system.

- Start-up costs and maintenance of useful systems can be significant.

- Challenges arise as with Illinois's EESRF, such as the required time commitment by district offices to submit the forms for current and past projects.

[21] NCHRP Web-Only Document 103 A-5

Lessons learned:

- In creating a CTS inventory data must be as detailed and organized as possible for later integration into larger asset management systems.

- A commitment tracking system alone is a good starting point in developing a larger EMS, the CTS should be designed with its ability to distribute data in another system later on. Ultimately, it should be able to lead to a system which provides notifications, reports, and communications.

D. Web/Online systems

Several asset management systems are now web-based such as New York's Project and Program Management Information System (P/PMIS), and Michigan DOT's system. [22] A number of systems are intending to become web-based in the future, which follows the logical course of technological advancement and information sharing.

Advantages:

- User friendly, information sharing, efficiency.
- Easily updated
- Can be linked with photos and other web information

Limitations:

[22] NCHRP Web-Only Document 103, A-pp.5-6

- Cost, program maintenance, development timeline, user training may be required.
- Web page and browser compatibility.
- Data loss or lack of accessibility if system has technical difficulties or is discontinued.
- Errors or inconsistency in the data itself; problems with the coverage, overlap and changeability of the databases; as well as problems and limitations in the tools provided by the database

Lessons Learned:

Web technology makes sharing data easier between agencies, districts, regions, and other users. It should be a goal to make any new system compatible with future online use.

E. Systems including GIS/Mapping Features

Benefits of GIS include the ability to visually and specifically locate environmental commitment data in any geographical range for which data exists, and to analyze available data regarding these commitments. With sufficient data, WisDOT staff could pull data to identify quantity and location of a specific commitment type, maintained activities, and the affiliated costs. The following states use GIS programs: Arkansas, Oregon, Washington, North Carolina, Minnesota and Indiana. [23] According to the literature reviewed, several of the states have exhibited use of "in the field" technology that allows for GIS data to be utilized and reports to be filed from the field, which has proven to be an effective way of assuring data is entered and is also a time-saving measure. [24]

Arkansas

The Arkansas State Highway and Transportation Department has a multiagency wetland planning team that has created a state wetland inventory and uses GIS to improve its wetland planning, management and monitoring.[25]

[23] NCHRP Web-Only Document 103 p. A 5-11
[24] NCHRP Web-Only Document 103
[25] NCHRP RRD 317 p.11

Washington

The Washington State DOT (WSDOT) commitment tracking system can generate reports which show whether all environmental commitments have been met prior to completion of the project and whether the maintenance and operations office has received and confirmed understanding of all long-term compliance expectations for the site. Literature does not report how maintenance and operations tracks compliance. "The system was custom built on a Microsoft SQL Server database using Microsoft .NET. All projects with project-specific commitments are now being entered, including CEs. In the long run, WSDOT intends to incorporate the different commitments into the database, to make the database map-able as a GIS layer in the GIS workbench, and to translate mileposts into GIS raster data. Ultimately, WSDOT is interested in incorporating performance measurement and reporting into the system as well."[26]

Florida

The Florida DOT uses a GIS database for "identification of priority areas for conservation and habitat connectivity improvements. They also developed a GIS model for road improvements projects that allows for scenario impact analysis "related to wildlife crossings, road mortality, habitat connectivity and other environmental impacts." [27]

Maryland State Highway Administration (MDSHA)

MDSHA has a GIS based system, the National Pollutant Discharge Elimination System (NPDES) which tracks compliance, asset management, environmental enhancements and administration. The GIS staff determines location of systems, tracks maintenance activities and addresses public complaints. MDSHA is working on a system for all NEPA EA and EIS projects and a system to track success of environmental stewardship goals. [28]

Oregon

[26] NCHRP RRD 317 p.12
[27] NCHRP RRD 317 p. 13
[28] NCHRP RRD 317 p. 13

The Oregon DOT (ODOT) has developed a sensitive resource inventory as part of the Salmon Resources and Sensitive Mapping Project. The database is used to "support planning, scoping, and appropriate maintenance activies." ODOT is working on an Internet based application to allow desktop access to data and to improve data sharing and inter-agency communication. A Transportation Management System is being developed for tracking assets, facilities, and systems. Ultimately this system will incorporate other systems that track environmental assets.[29]

Advantages:

- Sets of geographic information are grouped and automated within one piece of software
- Ability to visually and specifically locate environmental commitments
- Mapping tools for data presentation
- Spatial analysis tools
- Can cope with larger amounts of data
- Can cover large study areas.
- Can conveniently select any sub-study area.
- Can cope with unlimited and frequent edits and changes.

Limitations:

- Costs are often inhibitive despite the obvious advantages of GIS systems.
- Program maintenance and updating may be costly.
- The system may require a longer development timeline than simpler spreadsheet and checklist based systems.
- User training is required which may inhibit utilization of the system.
- Data integration

Lessons learned:

[29] NCHRP RRD 317 p.16

GIS is likely to be more widely utilized in the future as more staff with GIS skills enters the field and the technology becomes more user-friendly and affordable. In creation of the CTS, it would be ideal to have appropriate GPS coordinates recorded for any environmental commitment for easy data uploading into a future GIS system.

2. Activities Incorporating Environmental Commitments

Many of the agencies identify a "green ethic" being encouraged and embraced within the agency which helps employees to see environmental commitments as part of the project, rather than as an ad-on task and obligation. Systems have numerous types of communications: checklists, incorporation of environmental commitments into all documents and plans, and databases which provide access to all users, reports, and notifications systems. Several states are initiating or currently using GIS applications as well, which could be seen as a next step in environmental asset management. In the process of the literature review, a number of elements have emerged as key features in environment commitment tracking:

Ability to run reports and track internal compliance

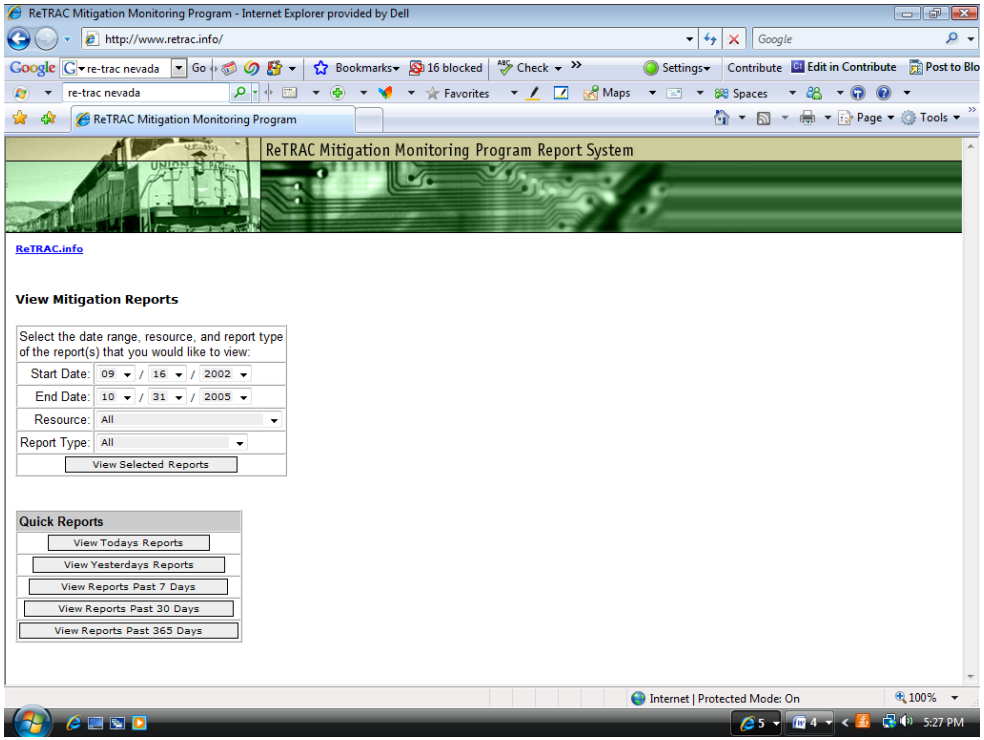
- Mapping/GIS
- Online/web-based.
- Notification Emails/Calendar Alerts.
- Integration- use of same project and contract numbers/GIS coordinates
- Incorporation into bid and contract documents, plans
- Checkpoints at different design stages

3. Public Domain Systems

A variety of software options for large projects exist which are in the public domain or may be available to share between state agencies, these include:

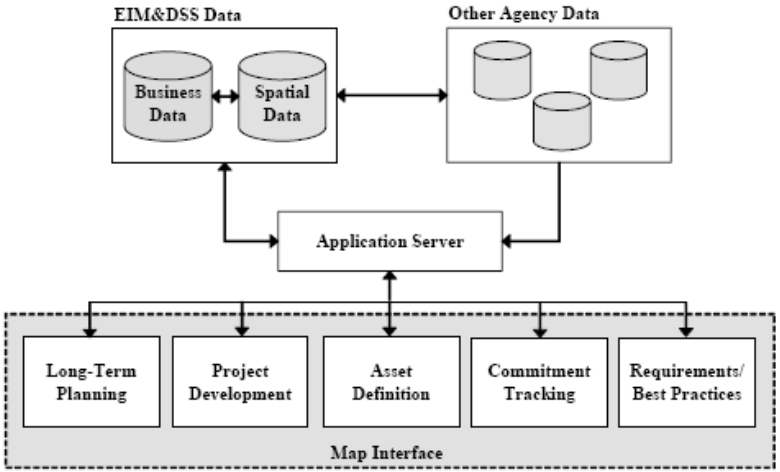
- ReTRAC: (Nevada)

- Texas ETS
- NHCRP Prototype Software for An Environmental Information Management and Decision Support System (Project 25-23(2)

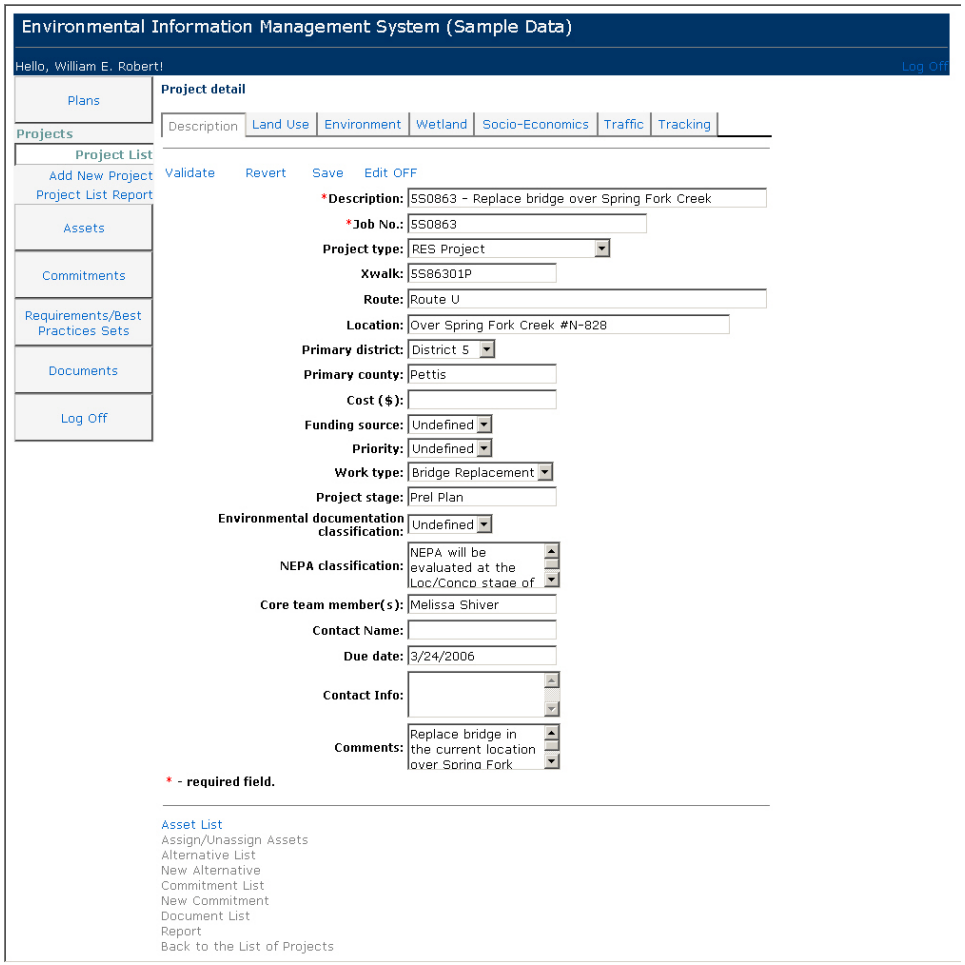


Public View of Nevada's Re-trac Mitigation Monitoring Program

Figure 3-1 EIMS Components



Organizational Structure of NCHRP Proto-Type Software



Sample EIMS View

4. Summary of Key Features:

An environmental commitment inventory will set the stage for a commitment tracking system, and should have data organized in a fashion which will be easy to incorporate into a future asset management system. The following traits should be included if feasible.

- Standardization
- Ease of Use.
- Accessibility and file sharing options.
- Ability to create reports and notifications.
- Online access through a central website/server.
- Integration of activity codes, consistency in contract or project numbers.
- Ability to utilize or integrate with GIS mapping programs.
- Incorporation into bid and contract documents and plans.

5. Conclusion

Like other Wisconsin DOT transportation assets, some environmental commitments need ongoing maintenance and monitoring in order to maintain functionality. A Wisconsin DOT tool for collecting and tracking environmental commitments that require ongoing maintenance and monitoring should demonstrate as many of the key features listed above as possible at this time.

The tool should be designed to expedite and facilitate its use in order to achieve Wisconsin DOT's objectives and goals.

Design of the tool should be balanced with available software, technical knowledge of staff, and ease of use.

The tool should be simple in functionality in order to enable and facilitate file sharing.

This tool should help with identification, location and maintenance and monitoring requirements and activities of environmental commitments. This data should facilitate communication amongst Wisconsin DOT staff and those responsible for maintenance.

For the sake of efficiency, data entry should be minimized and standardized, using consistent numbers for projects and environmental documents.

Each region should be able to maintain its own database, but maintain standardization so that compilation of statewide data is simple and data sorting is uncomplicated.

The tool should be designed with regard to technical progression. Data should be organized in a fashion that would allow it to be compatible with a geo-spatial database in the future, such as GIS.

Literature Review-Appendix A

California Permits and Agreements (PAM)

http://www.dot.ca.gov/ser/downloads/general/Sample_PAM.XLS

		SUMMARY OF REQUIRED PERMITS AND ENVIRONMENTAL COMMITMENT -PS&E PHASE								
		TO:		PROJECT MANAGER:				DATE:		
		ATTN.:		PROJECT ENGINEER:				CO. RTE. KP:		
		DESIGN OFFICE						RU/EA:		
								P.M.		
		Below is a summary of the required permits, and environmental commitments that must be incorporated into								
		the PS&E, for this project. Please contact_____@ _____ for further information.								
			Ref.	**NSSP Y/N**	**Responsible Staff**	**Timing**	**Action Taken**		**Date**	
		CDFG 1601/03 Streambed Alteration Agreement								

		All plants (both container and seed) used for restoration shall be endemic species.	1601, p. 1	Y	L.A. /Bio.	Design/ Const.				
		Caltrans quarterly inspections shall be done by the project biologist or a representative approved by the project biologist.	1601, p. 2	N	Bio.	Const./ Post-Const.				
		All restoration for temporary impacts shall be implemented in the appropriate season immediately following project construction at that location.	1601, p. 2	Y	Const.	Const.				
		BCDC: Bay Fill Permit								
		BCDC: Pub. Access Review								
		Coastal Dev. Permit: County								
		Coastal Dev. Permit: State								
		State Lands Lease Agreement								
		RWQCB: NPDES								
		RWQCB: Water Qual. Cert.								

		Endangered Species Act[1]								
		Consultation								
		USACOE 404: Nationwide								
		USACOE 404: Individual								
		USACOE Section 10 Permit								
		USCG Section 9 Permit								
		Noise Attenuation								
		Build soundwall at Southwest corner of Mission Avenue/Foussat Rd. 1.8m x 45.7m (6' x 150' wall).	ED, p. 18	N	Design/Const.	Design/ Const.				

		Water Quality								
		Caltrans shall conduct water sampling prior to the start of construction at locations above and below the project, as well as during construction, to determine base data and monitor siltation of project.	ED, p. 17	Y	Const.	Pre-const./ Const.				
		Hazardous Materials Investigation/Treatment								
		Prior to performing excavation work, personnel who will be working in the areas containing lead, shall complete a safety training program which meets the requirements of 8 CCR 1532.1.	ED, p. 15	N	Const.	Pre-const.				
		Material containing lead shall be placed a minimum of 2 feet above observed ground water and a minimum of one foot below finished grade.	ED, p. 15	Y	Const.	Const.				
		ESA/Archaeological								
		Under no circumstances is the contractor allowed to stage or otherwise use any unpaved areas between P.M. 24.0 and P.M. 26.7.	ED, p. 13	Y	Const.	Const.				

		For monitoring purposes, the District Archaeologist shall receive at least two weeks notice that the work will begin.	ED, p. 13	Y	Const./ Cultural	Pre-const.				
		ESA/Biology								
		Notify District Biologist two weeks prior to construction so that the two impacted oak trees can be flagged.	ED, p. 12	Y	Const./Bio.	Pre-const.				
		If impacts to the flagged oak trees cannot be avoided, the oak trees will be mitigated at a 10:1 ratio at an approved off-site location concurrent with project construction.	ED, p. 12	Y	Const./Bio.	Const.				
		Visual/Landscape								
		Revegetation will be initiated within one year of slope disturbance for cuts over 100 feet high east of I-5.	ED, p. 14	Y	Const.	Const.				
		If a permanent brow ditch is determined to be necessary by the hydraulics branch, it shall be colored to match the MSE crib-faced wall.	ED, p. 14	N	Design/Const.	Design/ Const.				
		Community/Social								

		To preserve views and some of the rural atmosphere along the route, the roadway profile will be depressed wherever practicable and all vertical elements of the project kept to a minimum.	ED, p.20	N	Design	Design				
		Construction								
		Construction activities that are adjacent to schools will be coordinated with school officials to reduce the level of noise impacts during school hours.	ED, p. 21	Y	Const.	Pre-const./ Const.				
		No construction activities are allowed at location #1 from February 15 to September 1.	ED, p. 11	Y	Const.	Const.				
		If night work is conducted, lighting shall be shielded or directed away from the ESAs.	ED, p. 11	Y	Const.	Const.				
		A copy of the project PS&E must be sent to Environmental for review before finalization.								
	☐	**Attachments**								
	cc: Design, Senior Envir. Plan., File			OFFICE CHIEF OF ENVIRONMENTAL PLANNING					Apr-04	

California Mitigation Monitoring and Reporting Record (MMR)

http://www.dot.ca.gov/ser/downloads/general/sample_mmrr_ECL-memo.xls

Ref.	Responsible Branch / Staff	Timing / Phase	NSSP Req.	Action Taken to Comply with Task	Task Completed		Remarks	Environmental Compliance	
					Initial	Date		Initial	Date
	Proj Mgmt & Proj Dev	Beginning of 1 phase							
	Proj Mgmt & Environmental	District PS&E Circ							
	Proj Mgmt	Contract Award							
	Proj Eng	Preconst Meeting							
	Proj Mgmt & Const	Const							
	Proj Mgmt & Const	Safety Review							
	Proj Mgmt & Const	Post Const							
-									
ED, p. 12	Const./ Biology	Pre-Const.	Y						
ED, p. 12	Const./ Biology	Const.	Y						

-									
ED, p. 13	Const.	Const.	Y						
ED, p. 13	Const./Cultural	Pre-Const.	Y						
-									
ED, p. 15	Const.	Pre-Const.	N						
ED, p. 15	Const.	Const.	Y						
-									
ED, p. 14	Const.	Const.	Y						
ED, p. 14	Design/Const.	Design/Const.	N						
-									

ED, p. 18	Design/Const.	Design/Const.	N						
-									
ED, p. 17	Const.	Pre-const./Const.	Y						
-									
ED, p. 20	Design	Design	N						
ED, p. 21	Const.	Pre-const./Const.	Y						
ED, p. 11	Const.	Const.	Y						
ED, p. 11	Const.	Const.	Y						
-									

1601, p. 1	Land. Arch./Bio.	Design/Const.	Y						
1601, p. 2	Bio.	Const./Post-Const.	N						

Literature Review References:

1. AASHTO Center for Environmental Excellence Online Compendium Manual found online January 2009 at: http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/detailed_toc.aspx

2. AASHTO Practitioner's Handbook

3. Asset Management Systems for Roadway Safety, FHA , found online January, 2009 at: http://www.tfhrc.gov/safety/pubs/05077/05077.pdf

4. CalTrans, Environmental Commitments Record, online document. Found online January, 2009 at: http://www.dot.ca.gov/ser/downloads/general/sample_mmrr_ECL-memo.xls

5. Cambridge Systematics, Inc, Parsons Brinckerhoff, Venner Consulting, Web-Only Document 103 Final Report for NCHRP Research Results Digest 317 Prototype Software for an Environmental Information Management and Decision Support System, November, 2006. Found online January, 2009 at: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w103.pdf

6. CTC & Associates LLC WisDOT Research & Library Unit , Tracking Environmental Mitigation Projects: A Survey of Methods Used by State DOTs Division of Transportation System Development, February 28, 2008

7. Environmental and Enhancement Group, 2003, found online at: Environmental and Enhancement Group

8. FHWA Domestic Scan: Environmental Commitment Implementation – Innovative and Successful Approaches. Prepared for the Office of Project Development and Environmental Review, FHWA, 2002. Found online January, 2009 at: http://www.environment.fhwa.dot.gov/strmlng/domScanRpt/index.asp

9. Land, Richard, Memorandum from Land to deputy district directors for Construction, Design, Environmental and Project Management, June 2005

10. Lerner, Andrew National Cooperative Highway Research Program, Research Record 317

11. Venner, Marie, et al, Benchmarking State DOT Environmental Commitment Tracking Systems, TRB 2007 Annual Meeting CD-ROM

E. Resources for Maintenance and Monitoring Best Practices:

Native Plantings

1. Roadside use of native plants: http://www.fhwa.dot.gov/environment/handbook.htm
2. Standards for native plants along Roadways: http://roadwaystandards.dot.wi.gov/standards/fdm/27-01-010.pdf
3. Native re-vegetation: http://www.nativerevegetation.org/learn/manual/bibliography.aspx
4. AASHTO best practices: http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/11_33.aspx
5. Local programs for native plantings: http://www.natureserve.org/visitLocal/index.jsp

Invasive Species

1. Wisconsin DNR Recommendations: http://dnr.wi.gov/invasiveS/
2. FHWA Resources:http://www.fhwa.dot.gov/environment/vegmgt/invasive.htm
3. AASHTO Best Practices http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/11_34.aspx
4. Facts about Invasive Species: http://www.nps.gov/plants/alien/factmain.htm#pllists
5. Invasive Species Resource Library: http://www.invasivespeciesinfo.gov/resources/orgprof.shtml
6. Invasive species resources: http://www.invasive.org/
7. USDA/ invasive species: .http://plants.usda.gov/cgi_bin/
8. Sample DOT Invasive Species Inventory Forms: View Sample Form [pdf / 8kb]

Wildlife Crossings, Culvert Maintenance and Monitoring

1. Crossing maintenance and monitoring: www.betterroads.com
2. Best practices for culvert maintenance: http://www.azgfd.gov/hgis/pdfs/CulvertGuidelinesforWildlifeCrossings.pdf

3. Crossings resources: www.ecopassage.com
4. Crossings resources: http://www.wildlifecrossings.info/
5. AASHTO best practices: http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/3_4.aspx
6. FHWA best practices for wildlife crossingshttp://www.fhwa.dot.gov/environment/wildlifecrossings/
7. Legal resources regarding transportation planning and wildlife: http://wildlifelaw.unm.edu/fedbook/index.html?PHPSESSID=gl-61bTCfeUdtauv3%2Ch%2Cj0
8. AASHTO best practices for crossing maintenance:
http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/10_5.aspx

Aquatic Habitat and Perched Culverts

1. Best practices for aquatic culverts: http://clean-water.uwex.edu/pubs/pdf/shore.fishfriendlyculverts.pdf
2. Best practices for aquatic culverts: http://stream.fs.fed.us/fishxing/help/7_Culvert_Basics/Perched_Outlet.htm
3. US Fish and Wildlife Service: http://www.fws.gov/
4. Legal resources regarding aquatic crossings: http://www.fws.gov/laws/lawsdigest/NFISHWK.HTML

Cultural Resources

1. Archeological resources http://www.environment.fhwa.dot.gov/histpres/archaeology.asp
3. Environmental Justice: http://www.epa.gov/compliance/resources/publications/data/planning/strategicplan/ej/index.html
4. Environmental Justice Checklist: http://www.dot.ca.gov/ser/guidance.htm#ej (downloadable file)
5. Environmental Justice at WisDOT: http://www.dot.wisconsin.gov/projects/state/docs/2030-ej.pdf

Stormwater

1.Using native plants for infiltration:
http://www.waukeshacounty.gov/uploadedFiles/Media/PDF/Parks_and_Land_Use/Land_Conservation/Stormwater/Index_Docs/Infiltration%20Practice%20Vegetation%20Establishment%204-09.pdf
2. Best Management Practices International: http://www.bmpdatabase.org/
3. AASHTO best practices: http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/10_6.aspx
4. California monitoring practices: http://www.dot.ca.gov/hq/env/stormwater/ongoing/index.htm
5. Roadway drainage and maintenance: http://www.nyc.gov/html/dcp/pdf/transportation/world_cities_pt2b.pdf

Environmental Commitment Tracking

1. FHWA Domestic Scan Report: http://www.environment.fhwa.dot.gov/strmlng/domScanRpt/chapter3.asp
2. FHWA resources: http://www.fhwa.dot.gov/construction/reviews/reven1.cfm
3. AASHTO best practices: http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/2_3.aspx