

In Tune with the Environment Process

JIM GULICK

Location Engineer

JANICE OSADCZUK

Environment Specialist

Division of Location and Environment, IDOH

INTRODUCTION

The environment process has its basis in a conglomeration of state and federal laws, guidelines, rules, regulations, and executive orders. Since the passage of the National Environment Police Act (or NEPA) in 1969, there have been many laws and guidelines enacted pertaining to the environmental process. The NEPA, itself, sets a broad national policy in relation to the environment and established implementation procedures. One requirement of NEPA, in projects utilizing federal funds, is that all environmental factors be considered. A systematic, interdisciplinary approach is to be used prior to committing a project to a definite course of action. Early consideration must be given to engineering and safety as well as biological, geological, economic, historic, archaeological and sociological factors. Other important acts and regulations include the following: the preservation of parklands, commonly called Section 4(f); Section 106 of the National Historic Preservation Act, which protects resources deemed significant in terms of American architecture, archaeology, and culture; Executive Order 11990, which protects wetlands; the Rivers and Harbor Act of 1899, which protects navigable waters of the U.S.; Executive Order 11988, which requires the evaluation of flood hazards; the Endangered Species Act of 1973, which requires the conservation of species facing extinction; Public Law 91-605 and 93-87, which promotes noise standards for highways; the Clean Air Act, which protects the nation's air resources; and Regulation EMB 1, 2 and 3, which are the state's equivalent to the Federal NEPA. There are about 52 environmental laws and regulations which may have to be complied with on a single project before a road or bridge can even be considered for detailed design. Such a multitude of laws indicates the significant amount of concern and importance attached to the environment by the public, the State Legislature, Congress and the President.

Just as the IDOH has had to adapt to changes in attitude concerning economics and safety in the past, it now must comply with the real world of environmental concerns. No longer can plans for a new bridge be

developed based solely on engineering and economics when the existing structure is deteriorating. Those days, for better or worse, are gone. It used to take about one year from the inception of the replacement of the bridge to its construction; now it takes about four years. Because “the highway’s” world is far more complicated than it has ever been in the past, it is imperative that everyone involved in the planning, development and construction of a project be “in tune with the environmental process”. The price of being out of tune results in unnecessary delays, the perpetuation of less than desirable conditions, poor use of manpower, and the bottom line, which could be the most important factor, the escalation of the cost of the project.

One of the major benefits of the environmental process is that it forces an early and orderly identification of the points of concern associated with a project. The early identification of potential problems and impacts leads to more effective and economical solutions. It also may help to minimize and eliminate future problems. For example, a project that has been developed properly should result in minimal relocation costs, a minimal amount of right-of-way take, and minimal problems obtaining permits.

The environmental process also has contributed significantly in building a more positive attitude towards the Indiana Department of Highways (IDOH) and improving relationships with other agencies and the public. One integral part of this process is the public hearing. Generally, there are two times when public hearings may be held—during the planning phase and during the design phase. Other public involvement meetings may also be scheduled depending upon the complexity of the project.

Likewise, meetings are regularly held with concerned public agencies to obtain their views. About once each month a meeting is held with representatives from the U.S. Fish and Wildlife Service (USFWS), the Indiana Department of Natural Resources (IDNR), the Division of Location and Environment, and the Division of Design. At these meetings, the design plans are discussed prior to the project’s preliminary field check. The purpose of these meetings is to review the project for conformance with the environmental study, to minimize environmental impacts where possible through design changes or mitigation measures, and to resolve problems before permit applications are made. Perhaps the most important result of these meetings is the development of credibility among agencies. It has taken several years to develop a good working relationship with the many agencies with which the highway deals. Our believability and the trust other agencies have in our fulfillment of our commitments is very important. When commitments are not met, we lose our credibility. This, in turn, harms and delays the development of future problems.

In Memphis, Tennessee, there has been a 26-year battle over a three-mile section of I-40, which would have sliced through historic Overton Park. The court case challenging these plans resulted in a landmark suit in 1971. After another decade of alternate proposals (including a \$250 million tunnel), the three-mile section was finally withdrawn from the interstate system. Traffic was routed over a new perimeter expressway. State and local officials are stuck with a section of abandoned interstate and a one-mile stretch of land located west of the park, that had been cleared of 100 homes for the proposed interstate.¹

While horror stories of this type have occurred elsewhere, Indiana has been most fortunate in the development and construction of its projects. This can be attributed to many factors. The citizens of our state are, by nature, fairly conservative. Indiana does not seem to have as many antagonistic activist groups as are found in many other states. We also seem to have an effective community involvement program. The IDOH tries to maintain credibility and a good working relationship with other state and federal agencies. Our staff is composed of persons having many areas of expertise, such as geology, archaeology, biology, economy, air, noise, and engineering. This interdisciplinary approach, coupled with a close working relationship with the design engineering staff throughout the development of the project, is another positive factor. The final, but by no means the least important of these factors, is luck. However, it must be recognized that the attitude of the public is changing, and we can expect increased challenges to any decisions we make.

We live in an age of documentation. Both elected officials and the public demand the accurate and effective documentation of why and how decisions are made in the highway. The environmental process begins as effective documentation of compliance with applicable state and federal laws and regulations. If litigation procedures concerning the environmental process are instigated, good documentation can make the difference between the success or failure in the defense of the suit.

SR 446, is, far and away, the best example of how documentation pays off. This section is located between SR 46 and the causeway at Monroe Reservoir. The project is approximately 7.5 miles long. a portion of the project involves the modernization of the existing roadway and another portion involves a new alignment.

The environmental documentation was approved. Shortly thereafter, the IDOH was sued by one individual, a citizens group and the Sierra Club.

¹James Peters, "Interstates: Nearing the End of the Road," *Planning* December, 1981), pp. 12-15.

At the trial, the plaintiffs presented three expert witnesses who claimed that the project would have significant impacts upon the environment. These can be summarized as follows:

- 1) Impact on Lake Monroe from sediment released during and after construction,
- 2) Inaccurate description of the wildlife habitat,
- 3) Secondary impacts such as increased residential development,
- 4) Inadequate identification of water impoundment.

About three hours after the plaintiff's witness had testified, the judge returned. The *Findings of Fact and Conclusions of Law* indicates the judge's thinking on the case. The following are excerpts of the Findings:

- 1) The record disclosed that the Indiana State Highway Commission (ISHC) accomplished extensive study in regard to sediment impacts,
- 2) The ISHC considered impacts upon wildlife habitat,
- 3) The ISHC analyzed the effects of primary and secondary impacts of the project, including the stimulation of residential and commercial development,
- 4) The ISHC analyzed the water impoundments and water quality impacts. The most important two points however, are the following:
 - 1) The ISHC coordinated and consulted extensively with federal, state, and local agencies.
 - 2) The record disclosed that the ISHC's determination was based upon an analysis of impacts on the human environment, as well as from a construction and engineering standpoint.

The court found that the environmental factors were adequately considered in the environmental document.

Without a thorough study of the impacts, coordinating the project with other agencies, and the documentation of decisions, the IDOH would have lost this case. This would have destroyed credibility and affected all future projects.

THE DEVELOPMENT OF THE ENVIRONMENTAL DOCUMENT

The environmental process begins with the compilation of background information. An initial field inspection is made of the project area. An environmentalist, a biologist, an hydraulics engineer and the location or design engineer study the site. At this time areas of environmental, hydrological and engineering concerns can be identified.

Possible habitat for endangered species, the presence of significant wetlands, prairies or high quality natural areas, and the presence of historic and/or archaeological sites are all examined. Also during the field check, the hydraulics and design engineers complete a hydraulic risk assessment, preliminary structure sizings and an analysis of possible horizontal and vertical alignments.

As a result of the field check, the location or design engineer prepares an engineer's report. This report describes the existing conditions of the project area and makes recommendations as to the scope of the project. From the data in this report, early coordination packets are transmitted to involved federal, state and local agencies. Upon receipt of input from these agencies, more points of concern are identified. The environmental staff and the design staff work together to formulate possible solutions. The practicality of these is evaluated. If the project involves major realignments or the study of several possible corridors, a corridor hearing is scheduled to obtain public input.

Eventually a decision is made, based upon all prior input concerning the type of facility to be constructed and the scope of work. A preferred alternative is selected.

No project can be built by the highway without impacting some aspect of the environment. It is the responsibility of the highway's personnel in cooperation with other concerned agencies to develop conceptual mitigative measures for these impacts. The meeting held with IDNR and USFWS to discuss the impact caused by the design of a project is one way mitigation measures are developed.

For example:

The truss on SR 29 in Carroll County over Deer Creek was built in 1930.

Recently the bridge was inspected and found to be narrow and deteriorating. It was recommended for replacement. The southern approach to the bridge is the infamous Sycamore Row. Sycamore Row supposedly sprouted from logs used in 1830 to corduroy a swampy section of the Michigan Road. The trees are considered to be of local significance. Sycamore Row extends about 1100 ft. south of the bridge and consists of 32 trees on the east and 22 trees on the west edge of SR 29. Many of these trees are within 10-18 in. of the roadway. The trees have created hazardous driving conditions for years. From time to time, the highway has attempted to upgrade the roadway and replace the bridge in the area of Sycamore Row but has been constantly thwarted due to severely adverse public opinion.

Because of the extreme sensitivity of Sycamore Row, four alternatives were developed for the replacement of the bridge—the no build, the replacement of the structure in place, the shifting of the alignment to the east to avoid Sycamore Row and shifting the alignment to the west,

also avoiding Sycamore Row.

Following a field check and coordination with other agencies, the decision was made that the road should be shifted about 150 ft. east of Sycamore Row.

A Section 404 Army Corps Permit was also found to be needed for this project.

The environment study for this project was approved, with the stipulation that no permanent below low water channel work take place except for foundation work or the shaping of the channel under the proposed structure. A field survey and further hydraulic studies, developed during the design phase of the project, indicated that an excessively long bridge would be needed to obtain an adequate waterway opening if the existing channel was to be maintained.

Several meetings were held with representatives of the USFWS and IDNR to discuss various alternatives for providing an adequate waterway opening for the structure and minimizing environmental impacts. It was finally agreed by all involved to relocate the channel for a distance of about 900 ft. saving the IDOH about \$70,000. The new plan eliminated the need to provide a longer bridge and resulted in a minimal amount of channel work and less roadway excavation. To mitigate the impact of the project on the environment, the following measures were added to the design of the project:

- 1) Preservation of the existing channel as an oxbow, blocking only the ustream end. Redirection of the main channel. Connection of the old and new channels with a ditch on the downstream end of the new channel.
- 2) The landlocked area between the old and new channels would be acquired as right-of-way, to protect existing wildlife habitat. No vegetation would be removed nor would any construction work be allowed in this area.
- 3) Riprap would be utilized along sections of the stream channel banks to provide protection against erosion.
- 4) Riprap would be randomly placed in the relocated channel bed to provide habitat.
- 5) The north bank of the relocated channel would be revegetated with woody species.
- 6) No vegetation would be removed nor would any construction work be allowed in the area between the existing and realigned portions of SR 29, other than the construction of drainage facilities.

Recently the designer has also been looking into the possibility of tightening the shift in alignment to avoid, as much as possible, intrusion

into a pond on the southern end of the project. With these measures included in the project plans, no problems are anticipated in obtaining an Army Corps permit.

This project ran into several potentially severe problems. Any one of them could have significantly delayed or even stopped this project. It is with these types of projects, especially, that careful observance to the environmental process is imperative.

THE DEVELOPMENT OF THE PLANS

The environmental document reflects areas of concern, elucidates reasons for decisions that have been made, and discusses the types of mitigation measures to be incorporated into the project. Because of this, copies of the environmental document are provided to survey, the Federal Highway Administration, construction and the designer for reference during the development of plans.

It is up to the environmentalist and senior design engineer assigned to the project to ensure the preliminary plans are consistent with the environmental document as well as any mitigative commitments that have been made. The feasibility and cost effectiveness of mitigation measures are restudied. For example, some types of measures that could be used include the following:

Excavated Catchment Basins—Their purpose is to create a shallow water basin as replacement wetlands. Construction and maintenance costs are low.

Landform Contouring—This is accomplished using slope reduction measures along natural or created contour lines in order to direct and control runoff. The cost of construction and maintenance is low.

Hay Bales—These serve as a temporary measure during construction to minimize erosion and trap sediments until slopes are permanently vegetated and stabilized. Both the cost of construction and maintenance are low.

Slope Terraces—There is an earth embankment and channel constructed across the slope at a suitable location. It intercepts surface runoff. This will control surface runoff and reduce erosion by shortening the length of slope. Both construction and maintenance costs are low to medium.

Inlet Sediment Traps—Its purpose is to collect storm runoff from collection ditches, trap minor amounts of sediment and divert flow to piping systems. Both construction and maintenance costs are low.

Check Dam—A pervious dam constructed in a channel or drainage ditch. Its purpose is to slow velocity to a non-erosive rate and to detain runoff to settle out sediment. Both construction and

maintenance costs are low.

Silt Fence—This is a plastic filter cloth draped on supporting frame or fence to settle out sediments and prevent intrusion into adjacent wetlands. Construction costs are low.

Earthen Fill with Select Material Backfill—The unsuitable material is removed from the area to be filled and replaced with select material backfill. This provides a firm, stable foundation without causing displacement of the adjacent and underlying compressible wetlands soils. The cost of construction is low to medium and the cost of maintenance is low.

Contained Fill with Steel Sheeting—This accomplishes the same goal as the last measure. It does require less excavation of compressible wetland soils but results in high costs due to the sheeting.

Bridge Spans—These are constructed in a wetlands in lieu of an earth fill. Their use avoids bisecting wetlands and allows an unimpeded passage of wildlife. Any length of bridge in excess of hydraulic requirements could result in high costs. Bridging wetlands, while best from a preservation of wetlands viewpoint, represents a major cost expenditure.

It is hoped that judicious use of some of the previously mentioned mitigative measures can accomplish the same goals as using bridge spans at a reduced cost.²

If modifications in the design of a project are anticipated, meetings are held with the concerned agencies to obtain their input for the changes, and the environmental study is supplemented. When the preliminary field check is held, concerned agencies such as the IDNR and USFWS, as well as a representative from the Division of Location and Environment, are invited by the Division of Design to attend the field check and are provided a set of preliminary field check plans. Further revisions and mitigation measures may be added at this time. The development of the project is kept as flexible as possible to provide the safest, most economical and well designed project while still minimizing impacts to the environment.

The senior designer and the environmentalist then prepare the design study report. This report documents that the design of the project reflects and is consistent with federal, state, and local goals and objectives. The opportunity for a hearing is offered, soliciting public participation. The design study report reflects environmental commitments made both in the environmental study and as a result of any meetings.

²P. A. Erickson, G. Camougis, and N. H. Miner, *Highways and Wetlands*, Vol. II *Impact Assessment, Mitigation, and Enhancement Measures* (Washington, D.C., 1980) pp. 108-161.

CONSTRUCTION OR ACTIONS SPEAKS LOUDER THAN WORDS

Tinicum Marsh, a 500 acre wetlands, is the last remaining tidal wetlands in the State of Pennsylvania. The Pennsylvania Department of Highways planned, in conjunction with local conservation groups, construction of I-95 through the southern edge of the marsh. It was felt that this location would interfere the least with tidal flows as well as obliterating the least amount of marsh habitat. This compromise, however, was not included as a restriction when construction bids were advertised. The contractor negotiated contracts with the private owners of the marshland to obtain sand and gravel lying under the marsh for roadway fill. These contracts also obligated the contractor to fill other parts of the marsh to a level above the highest tide so that light industrial facilities, high rise apartments and/or shopping centers could be erected. Even though this filling was not a direct result of the roadbed construction, the entangling contracts tied it intimately with the highway construction.³

If incidents such as this are to be avoided, environmentally sensitive projects must receive special treatment prior to and during the construction phase of the project. The final plans, specifications and estimates should be revised for conformance with commitments, both in the environmental and the design document. Special concerns should be addressed to the contractor and the project engineer during the preconstruction conference. In addition to an archaeologist surveying the borrow pit area, the project engineer is to look over the proposed borrow area for possible impacts to wetlands, historic sites, etc. Also of importance is the receipt of feedback from the contractor and the project engineer concerning the effectiveness of mitigation measures. Where mitigation measures are found to be ineffective in the field, new solutions need to be developed. A few years ago, project engineers notified the central office that the fish pool/sediment traps that had been designed were, under certain circumstances, ineffective. A meeting and on-site review of the problem was undertaken. As a result of this and further input from the Soil Conservation Service, fish pools and sediment traps were redesigned. Mitigation measures that do not work are less than useless—they cost money and waste time.

The IDOH recently completed construction of a small length of roadway through a fairly high quality wetlands. Because of the environmental sensitivity of the project, a detailed list of mitigation measures was developed to minimize the impact upon the wetlands area. The list in-

³National Cooperative Highway Research Program Report, *Ecological Effects of Highway Fills on Wetlands* 218A (December, 1979) pp. 12-14.

cluded the following: The reconstruction, acre per acre, of wetlands primarily destroyed by the project; the use of "B" borrow and equalizer pipes to minimize changes in the mean water level, periodicity and the circulatory patterns of the wetlands water (the "B" borrow, a permeable material, would allow the unimpeded flow of ground waters in the wetlands); the use of "B" borrow in the fill, up to two feet above the ground water level; the use of a pipe to connect the surface waters of the bisected wetlands; the signing of right-of-way, "do not spray", voiding the use of herbicides; the removal of the existing fill of a parking area within the proposed right-of-way limits and the reconstruction of this area into a wetlands; the revegetation of the newly created wetlands with desirable wetland species; the excavation to various set elevations, yielding new open water wetlands offering a variety of wetland habitats; the placement of an organic layer such as peat to be in the bottom of the new pond area to expedite the development of wetlands vegetation; the creation or the maintenance of buffer areas of trees and shrubs; the use of standard siltation and erosion control methods; and the placement of a silt screen along the open water wetlands area.

Most of these measures were successful. There were problems of clearing into the wetlands, beyond the right-of-way limits, to provide storage areas. There was also a problem similar to what happened with the I-95 project in Pennsylvania. One of the land owners proceeded to fill in some portions of the wetlands next to our right-of-way. Because native materials were used (sand), several of the erosion control measures were deleted. Some minor amounts of erosion did occur, indicating that perhaps some of the erosion control measures should not have been deleted. Initially, regeneration of native vegetation seemed far more successful than revegetation.

Lack of coordination between agencies can end up with unfortunate results. If, however, all of those involved in highway development and construction work together in a spirit of cooperation, future problems can be minimized.