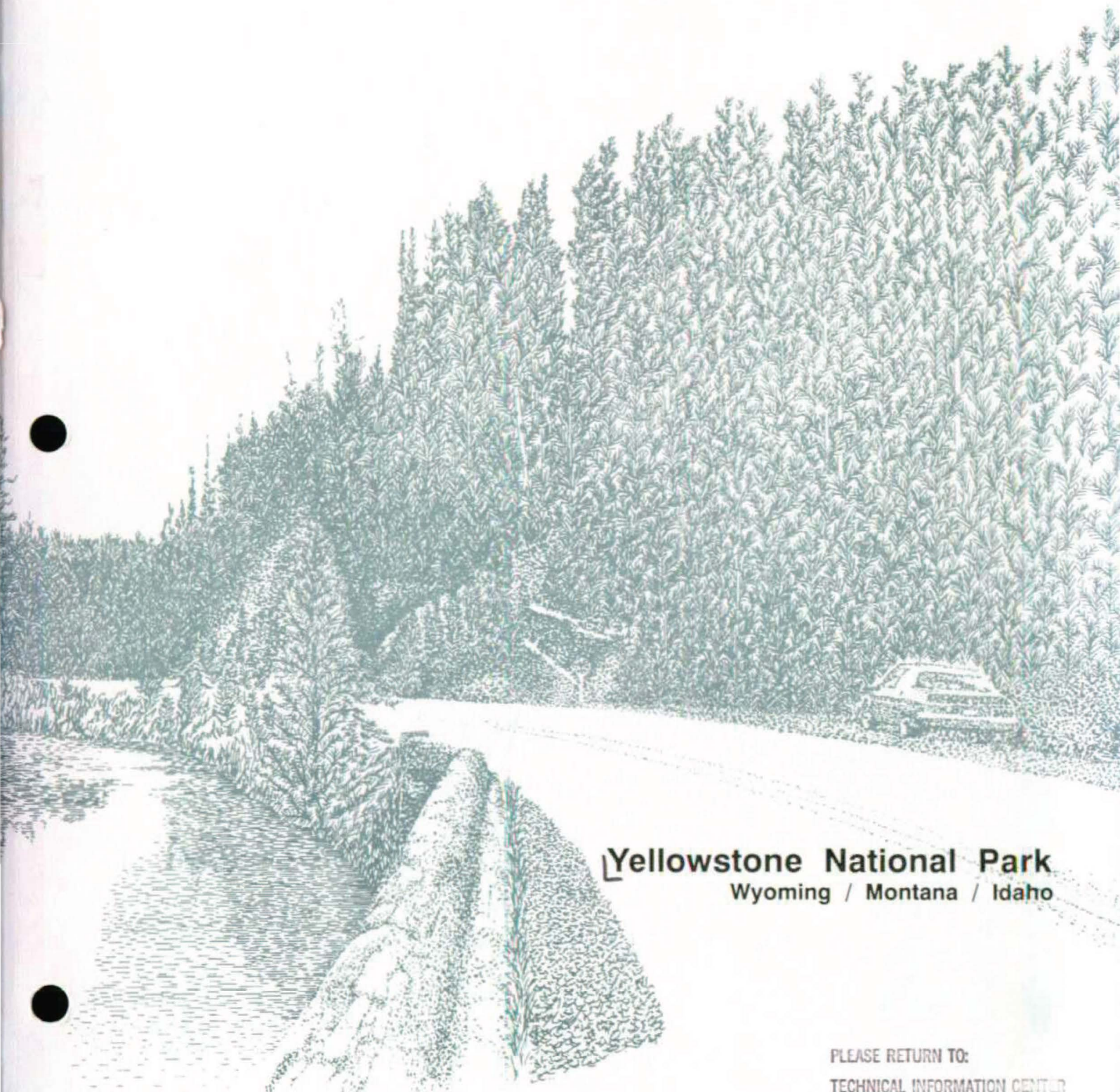


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Parkwide Road Improvement Plan



Yellowstone National Park
Wyoming / Montana / Idaho

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parkwide road improvement plan

August 1992



Typical Poor Road Condition



Typical Reconstructed Road

Yellowstone National Park • Wyoming / Montana / Idaho

SUMMARY

The National Park Service has prepared this plan for road improvement for Yellowstone National Park that also addresses material source needs. The intent of the parkwide road improvement plan is to preserve and extend the service life of principal park roads and to enhance their safety. Separate route- and design-specific environmental documents will be prepared as needed for each road improvement project.

This document was prepared in compliance with the requirements of the National Environmental Policy Act, section 7 of the Endangered Species Act, and the National Historic Preservation Act. Consultation with the U.S. Fish and Wildlife Service was conducted concurrently with a public review of the draft. Consultation has also taken place with the historic preservation offices for the states of Wyoming, Montana, and Idaho.

The plan calls for a long-term program of road improvement consisting of a combination of major reconstruction (MR) projects and resurfacing, restoration, and rehabilitation (3R) projects. Material sources are discussed. Existing sources in the park as well as sources outside the park have been identified by the Federal Highway Administration.

No significant adverse effects on natural resources are likely under the plan. There could be adverse effects on cultural resources, but any adverse effects will be appropriately mitigated. The plan would vary and disperse road improvement activities in the park, minimize resource impacts, and enable reclamation of existing material sites in the park.

The draft plan/environmental assessment was made available for public review from March 15 through April 15, 1992. A total of 10 comments were received, including those from BIKE Centennial, National Parks and Conservation Association, Greater Yellowstone Coalition, Wyoming Game and Fish Department, the Geological Survey of Wyoming, State of Wyoming Public Service Commission, and the Wyoming Department of Commerce Division of Parks and Cultural Resources. Major concerns included the potential effects of road improvement: increased visitation, increased traffic, and faster speeds; lack of adequate bicycle lanes; and development of material source sites (see approved Finding of No Significant Impact, appendix E).

As a result of public comment, vehicle size limits will be evaluated as an alternative for specific road segments, all material sites will receive more specific analysis addressing full use of a pit and complete reclamation, the one-foot unpaved shoulders will be paved, and park geologists will assist in planning and design of road segments to minimize effects on thermal features.

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INTRODUCTION

Yellowstone National Park is located mainly in the northwestern corner of Wyoming with portions that extend into southwestern Montana and southeastern Idaho (see Region map). The park lies within Wyoming's Teton and Park counties, Montana's Park and Gallatin counties, and Idaho's Fremont County. Yellowstone encompasses 2,221,722 acres (3,472 square miles), with an existing active and improved road system of approximately 329 miles. Yellowstone, parts of six national forests, and Grand Teton National Park, including the John D. Rockefeller, Jr., Memorial Parkway, comprise the Greater Yellowstone Area (GYA) (see Greater Yellowstone Area map).

In 1915 the first entrance permit was issued for an automobile, and Yellowstone was forever changed. Horses and stagecoaches rapidly became things of the past, and roads built for horses and wagons were tortuous for automobiles. Motors overheated and brakes burned out on steep grades; vehicles sank over their hubs in mud after rainstorms. Nonetheless, travel by auto was faster and cheaper than by stagecoach. Automobiles made Yellowstone accessible to a much broader segment of the public, and the development of safe roads became important.

The Grand Loop Road, which grew out of the need to provide visitor access, traces a figure-eight pattern through the center of the park, and together with the five entrance roads, forms the principal park road system. It provides the only means of motor vehicle access to the geologic and scenic wonders of Yellowstone. Major access roads enter the park from the north, northeast, east, south, and west, and feed into the large central loop road system, which connects the park's major visitor attractions. Many of the highways in the tri-state region lead to Yellowstone, and the principal park roads form the hub of the region's limited highway network. Numerous collector roads provide access to facilities such as parking areas, picnic sites, employee residences, and administrative and maintenance facilities.

Park roads are intended to enhance visitor experiences while providing for the safe and efficient accommodation of park visitors (*National Park Service Park Road Standards* 1984). The National Surface Transportation Assistance Act of 1982, PL 97-424, established a coordinated federal lands highway program (FLHP) for the construction and rehabilitation of federal agency roads, including park roads. The Park Service has the responsibility to construct, operate, and maintain its roads in a safe and aesthetically pleasing condition to the greatest extent possible. Consistent with this mandate, a long-term program has been initiated to address the surface transportation system needs within its jurisdiction (NPS 1986).

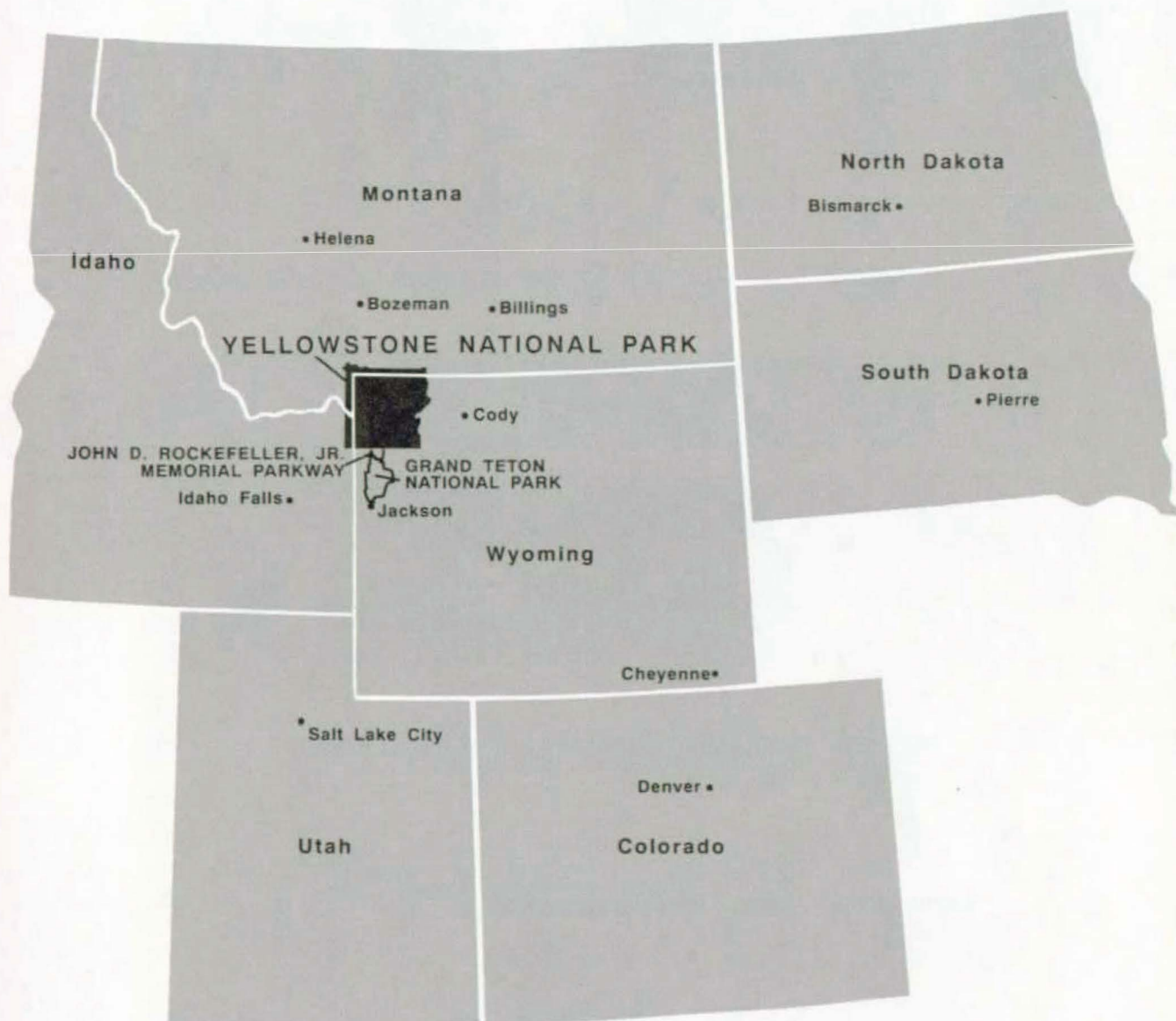
The Master Plan, Yellowstone National Park (1974) states the following concerning park roads:

Modifications and improvements initiated since the turn of the century have transformed into a primary through-system what was conceived of as, and remains in standard and design a secondary road circulation system. Developed for the most part in the railroad-stagecoach era by the Army, the park's road system is now overburdened due to the phenomenal growth of automobile travel, for which it was never designed. Complicating the problem and frustrating the solution is the fact that Yellowstone National Park's interior roads also serve as the strategic

keystone to the region's limited internal transportation network. . . . With completion of the impact-area bypasses, the existing road system will be adequate to serve current visitor travel to the park.

The Greater Yellowstone Cooperative Regional Transportation Study was an intensive, three-year effort to examine the regional transportation system and present alternatives for access to and circulation within the region over the next 20 years. The *Final Report: Assessment of Alternatives* (February 1979) was the culmination of that effort. The conclusion was that "the existing transportation system has the capacity to meet future needs, with minor improvements to relieve congestion." In accordance with the direction given, this plan retains the existing road network in its present configuration.

Surfacing material used to construct the present park road system was obtained from sources within Yellowstone. Very few of these sources are still used for the production of the aggregates needed for the continuing park capital improvement and maintenance programs. Some of the abandoned material sites have been adapted to secondary uses such as administrative or maintenance operations areas, material or equipment storage yards, and debris disposal areas. Some sites have been partially or totally reclaimed and blend into the adjacent scene, but most evidence scars that, while hidden from public view, intrude upon and detract from the natural beauty of the area. In certain instances, temporary reactivation of a material site under a predetermined plan of operation and reclamation will mitigate or erase unsightly and long-lasting landscape scars.

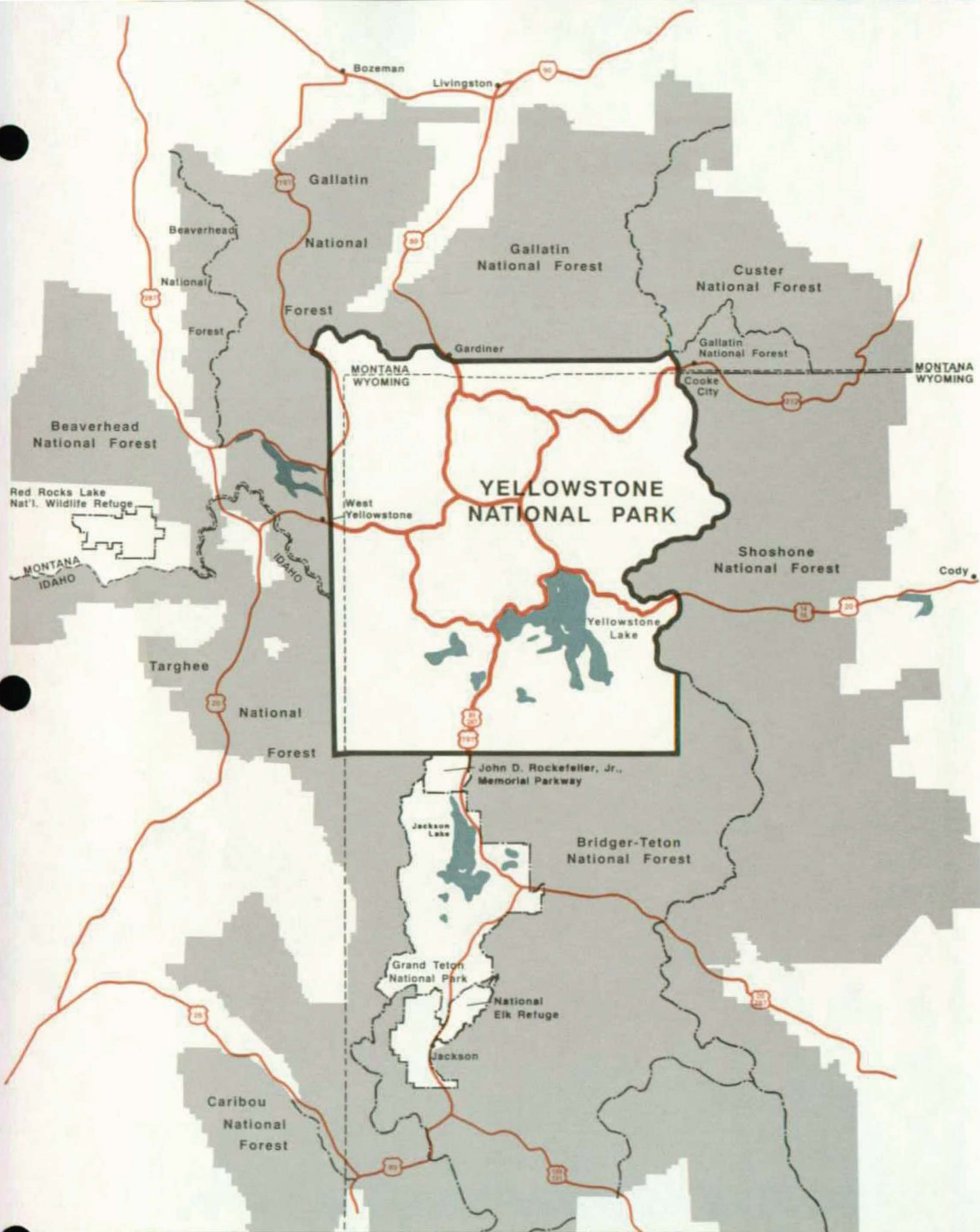


NO SCALE

ROCKY MOUNTAIN REGION

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GREATER YELLOWSTONE AREA

YELLOWSTONE NATIONAL PARK

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ISSUES AND CONCERNS

The intent of the parkwide road improvement plan is to preserve and extend the service life of principal park roads, enhance their safety, and continue access to Yellowstone National Park and its features.

NEED FOR ROAD IMPROVEMENT

A substantial portion of the Yellowstone principal road system is in critical need of improvement. Much of the 329-mile system of paved roads is structurally and/or functionally deficient. The 1988 FHWA evaluation rated only 28.4% of the road system in good or fairly good condition (FHWA 1990); the remaining 71.6% of the system was rated fair to very poor. In addition to the low structural quality of most roads, bridges are in need of repair, and road shoulders are inadequate for modern travel. The roads have deteriorated to such an extent that Yellowstone's cyclic road program (less than \$1.0 million per year) is used mainly for patching and stop-gap repairs.

The roads were not designed to safely handle the vehicle mix (including bicycle riders) nor the heavy volume of traffic they now receive in the six months that they are open each year. The volume of traffic, the variety of vehicles, the skill (or lack thereof) of the drivers, and the poor condition of much of the road system (including pullouts and attraction areas) combine to create many dangerous situations. The health and safety of the visiting public as well as the economic viability of the gateway communities and the park community are dependent upon a transportation chain with some very weak links.

One of the most frequent complaints of park visitors concerns the poor quality of the roads within the park. Park managers, visitors, concessioners, and individuals within the gateway communities realize that without action, continued deterioration of the road system is inevitable. Concerned parties realize that road improvement is required. Disruptive as this may be, forestalling construction will only require greater dollar expenditures and increased negative impacts on visitors and commercial enterprises in the future.

Serious accidents have occasionally been caused by the condition of the road system. During the three-year period from January 1, 1982, through December 31, 1984, 1,228 motor vehicle accidents occurred within the park. Twenty-five (or 2 percent) of the total were attributed to road defects. A traffic study completed in 1986 pointed out that park roads with narrow and/or unstable shoulders and park roads with significant defects create unsafe driving conditions. The large number of visitor complaints regarding the poor quality of the roads within the park is an indication of a problem that will only become worse.

Road surfaces in Yellowstone are generally deteriorated due to aging pavement, sub-base failures, and poor drainage (FHWA 1990). Most of the roads were constructed decades ago over old wagon roads. The current number and weight of vehicles and the early opening of roads in the spring was not anticipated. Major improvement of roadbeds is needed. Widths are not adequate for modern travel, which includes bicycle traffic mixed with recreational vehicle use and tour bus traffic. Poorly draining sub-base material retains moisture and has contributed to pavement failure and heaving during the spring thaw.

Many park roads are severely rutted, cracked, and potholed. Existing road widths in the park, with the exception of a few newly reconstructed segments, vary from 22 to 26 feet with minimal or nonexistent paved shoulders. Recreational vehicles up to 8 feet 6 inches wide, with side mirrors extending out another 18 inches on each side, are common throughout the park. The narrow road widths require a high degree of driver concentration, and the narrow or nonexistent shoulders provide no recovery zone if a vehicle strays from the pavement. Because there are few paved shoulders, bicycles are ridden in the traffic lanes. The pavement edge often has a sharp drop off, creating a hazard and promoting damage to the pavement edge. Traffic is often backed up by slow-moving vehicles. There are few pullouts to encourage slow vehicles to pull over, and many of the existing pullouts have abrupt pavement edges. Passing is often difficult because of poor sight distance due to curves in the road and encroaching roadside vegetation. Inadequate sight distance is a hazard to wildlife as well as to motorists. Several inadequate culverts reduce or prevent fish spawning.

Additional elements contributing to the deteriorating condition of the Yellowstone principal road system include: (1) the impact of the substantial number of heavy trucks needed to supply concessioner facilities within the park and to construct and maintain the park infrastructure, (2) the extremely variable quality of surfacing and paving aggregates used in the initial construction and periodic rehabilitation of the present road system, and (3) inconsistent funding for routine and preventive maintenance programs for park roads.

The average service life of the asphalt pavement structure of intermediate-type roads, such as principal park roads, is 15 to 20 years. Then the surface deteriorates and should be rehabilitated by repaving with an asphalt overlay and drainage corrections, shoulder reinforcements, and safety improvements. Asphalt pavement should be maintained by chip-and-seal coat applications on a six- to seven-year cycle. Reclamation of abandoned material sites and other areas disturbed during construction requires the preservation of quantities of topsoil, obtained within the park, for plant growth medium.

NEED FOR ROAD MATERIAL SOURCES

A long-term program of improvement and continuing maintenance of the Yellowstone principal park road system will require substantial amounts of raw material suitable for the production of mineral (crushed stone) aggregates, sand, common borrow, and topsoil (collectively referred to in this document as material). Material will be needed for maintaining existing road surfaces, for possible widening of the existing roadbeds, for reinforcing shoulders, and for supplying fill to provide a top width consistent with other recently improved roads in the park.

The quality of raw material used in processing pavement and concrete is important; raw aggregates must be clean, hard, durable stone. The material particle size must be such that a specific grading of material can occur through processing such as crushing or screening. The material cannot be susceptible to chemical change through exposure to air or water. It must also be resistant to degradation or breakdown from weather and loading stresses. Material sources should contain a sufficient quantity of raw material of consistent quality to

facilitate extraction and processing in an orderly and economical manner. Reject material, such as fine particles, will be returned to the source during reclamation.

The location of material sources relative to the application point is important due to the high cost of material hauling and corresponding high cost to the environment. Many existing commercial suppliers are located far from the park boundary. Other direct costs include royalties charged by commercial suppliers and reclamation costs on public land sites (reclamation cost is included in the royalty charged by a commercial supplier).

PURPOSE OF THE PLAN/EA

The FLHP is funded by motor fuel taxes. Over the next 20 or more years, some FLHP funds are projected to be budgeted for major reconstruction (MR) as well as resurfacing, restoration, and rehabilitation (3R) projects programmed for Yellowstone. Roads that eventually will be reconstructed will receive 3R treatment as a preventative, short-term, or temporary solution. The effects of the entire program of road improvement are addressed on a parkwide basis to guide decision making and assess cumulative environmental effects. The evaluation of known or potential mineral aggregate sources to satisfy long-term road improvement and maintenance requirements is also essential. Environmental documents will be prepared later to analyze the effects of improving specific road segments. They will incorporate preliminary engineering design data as it is developed, and will also analyze the impacts of obtaining material for the route-specific road projects.

This parkwide road improvement plan describes: (1) overall road improvement needs for principal park roads in Yellowstone, (2) common borrow and mineral aggregate requirements, (3) material sources needed for long-term road reconstruction, rehabilitation, and maintenance. Because most specific road segment designs have not yet been developed, environmental assessments will be prepared for each section as major reconstruction progresses.

The study area includes the park as well as public and private lands in the GYA located within approximately 20 miles of the park boundary (see Greater Yellowstone Area map). Potential material source areas were limited to those within 20 miles of the park because hauling costs increase substantially when long distances and steep grades are involved. This plan assumes all paved principal park roads will be improved and that sources of considerable quantities of material will be required. At this time, no construction of new roads or major realignments of existing roads are planned, but certain realignments to avoid environmentally sensitive areas may be considered later. Geotechnical data is still being gathered between Gardiner and Mammoth that could influence final decisions on the road realignment of this segment.

Road Improvement

For purposes of functional classification, the routes that make up the park road system were grouped into two categories based on use: public-use park roads and administrative park roads (NPS 1985). The assignment of a functional classification to a park road was not

based on traffic volumes or design speed, but on the intended use or function of that particular road or route. Principal park roads are one of four classes of public-use park roads in Yellowstone. Roads that fall under the other three categories—connector park roads, special purpose park roads, and primitive park roads—are not covered in this plan. They will be included in site-specific plans such as development concept plans.

The study area specifically includes the principal park road system with a construction limit (limit of surface disturbance) measured horizontally from the existing ditch line on both sides of the road (see Road Improvement Study Area map). The disturbance width will vary depending on the slope and terrain, and will total approximately 100 feet. Rolling or steep terrain requires cut and fill slopes for road widening in MR, necessitating a wider construction limit than road segments along flat terrain. Whenever possible road base widening will be confined to one side with the center line shifted accordingly to avoid important historic or natural features or large cut and fill slopes along the roadside. Center line shifts will be dependent on existing geometry and will comply with standard safety design principles. Areas disturbed for construction will be minimized.

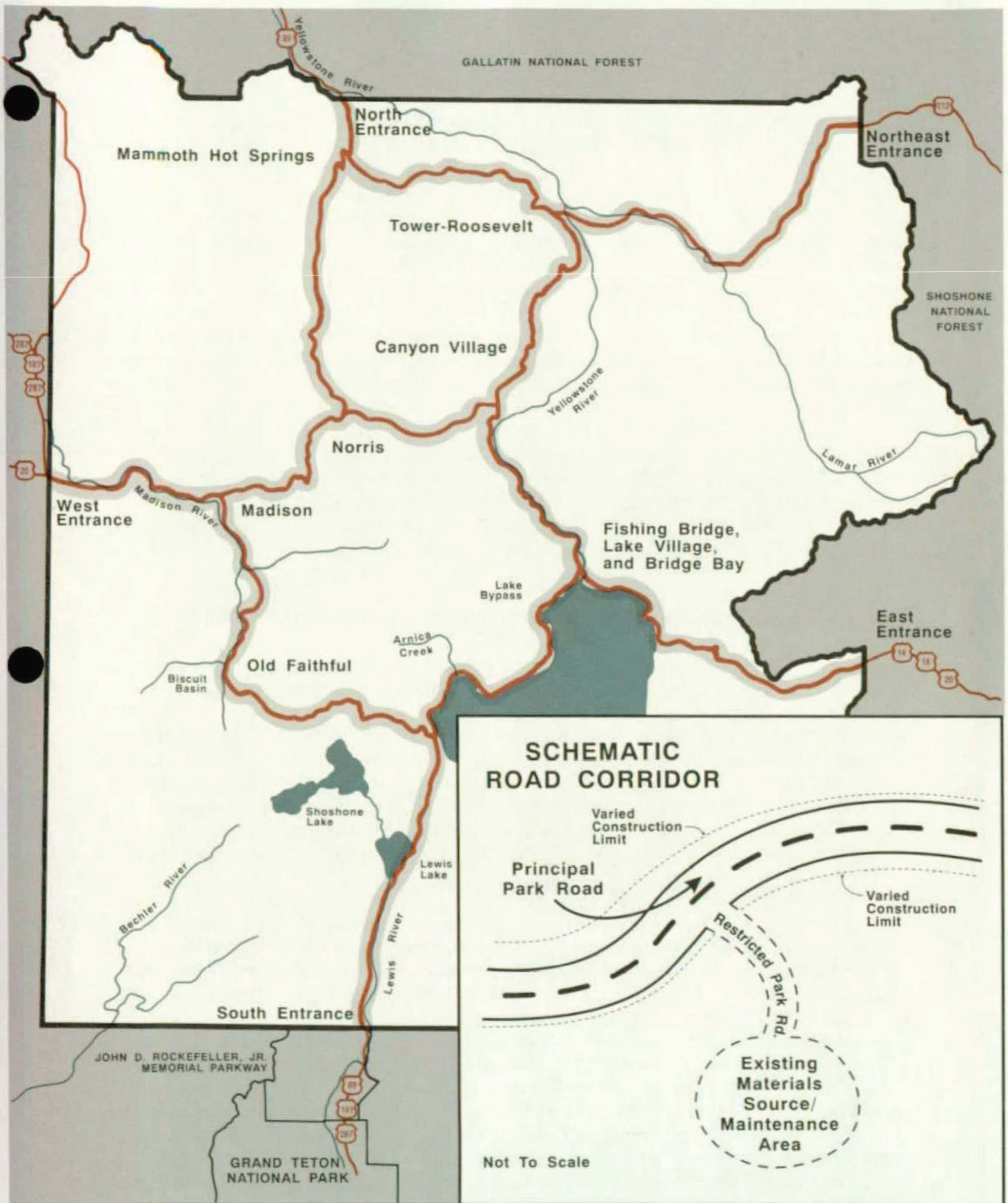
Material needs for twenty-two miles of Yellowstone's south entrance road are included in the *Draft Road Material Source Plan/EA, Grand Teton National Park* (NPS 1991d) because of the geographic relation of this area to Grand Teton and the lack of suitable material sources in southern Yellowstone.

Road Material Sources

The FHWA (1990) *Preliminary Draft Material Source Study* identified potential and existing material sources within the park and on lands within 20 miles of park boundaries; potential source areas beyond this range were considered infeasible due to long haul distances with steep grades that would greatly increase transportation costs (see appendix A). The FHWA used technical feasibility criteria (quality and quantity) to evaluate potential reserves and engineering quality of material. Service roads to existing material sites may require grading or other minor preparation or upgrading to allow heavy equipment access to the sites.

Sites examined by FHWA included existing sites in the park and sites outside the park in Gallatin County and Park County, MT, Teton County and Park County, WY, and Fremont County, ID. Previously evaluated sites in Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway area (NPS 1991d) were also included; these mineral aggregate sources could potentially supply the southern sector of Yellowstone. The FHWA study also quantified projected road material needs, including estimates for common borrow, for the next 20 years in different areas of the park.

A total of 213 potential sources of raw mineral aggregates were investigated by the FHWA. Many of these are existing material source sites (borrow pits) within park boundaries. The majority of these sites are old gravel pits, quarries, or other areas previously disturbed by human activities—some of which were not reclaimed. These sites have varying degrees of plant growth and varying needs for restoration. Restoration costs can be funded with a road improvement project if the material site supplies the project. Sources of restoration funding have been very limited in the past. The state of Wyoming has shown a willingness



ROAD IMPROVEMENT
STUDY AREA



NO SCALE

ROAD IMPROVEMENT STUDY AREA

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to assist in the reclamation effort. There is potential for developing existing sites for limited-term material sources. Site restoration will be accomplished at the end of the project.

The FHWA identified several in-park sites as likely for generation of mineral aggregates under a preplanned program of reclamation and revegetation. Eleven general areas or specific sites containing reserves of raw mineral aggregate material also were identified on private or public lands outside of park boundary (FHWA 1990), some as far as 20 miles from the park.

Construction projects in the past have extracted material from riverbeds inside and outside of the park. Stream channels and floodplains are generally recognized as sensitive resources and are not usually suitable as sources for sand, gravel, or borrow. However, under some conditions, use of these areas could result in fewer or shorter-term impacts than upland sources. For example, periodic removal of stream-deposited sand, gravel, and cobble material is often necessary to clear stream channels under highway bridges. This type of material source should be analyzed in conjunction with upland sources in and around the park as material is needed for future route-specific road projects, along with the appropriate compliance and post-extraction monitoring. No new sources will be established on designated wild or scenic rivers.

NATIONAL PARK SERVICE POLICY AND OTHER PLANNING CONSIDERATIONS

National Park Service Management Policies (Chapter 9:4, 1988) provide specific direction on the potential use of park and nonpark mineral aggregate sources:

Material from borrow pits or other sand or gravel sources on NPS lands, including submerged lands, may be used only by the National Park Service in connection with functions necessary for park administration. Superintendents will only create or use new borrow pits or other sources or continue to use existing sources inside the park if it is determined, based on a written analysis, that economic factors make it totally impractical to import sand or gravel and if acceptable sources are identified in the park resource management plan.

When the National Park Service must obtain borrow material or create spoil areas within a park, it will use areas devoid of significant cultural and natural resources, as identified through appropriate studies, and areas not viewed or used by visitors. Such areas will be restored to be compatible with the surrounding environment. All proposals for obtaining material from a previously unused source within a park will be reviewed under all pertinent environmental statutes, including the National Environmental Policy Act (42 USC 4321 et seq.), the National Historic Preservation Act (16 USC 470 et seq.), the Endangered Species Act (16 USC 1531 et seq.), and the Clean Water Act (33 USC 470 et seq.). All applicable federal, state, and local permits will be obtained prior to the creation and use of new borrow sources.

Borrow pits and spoil areas outside parks will also be evaluated to ensure that use by the National Park Service or its contractors complies with all applicable statutes

and regulations and does not negatively impact resources or values inside the park. Such areas will be restored as appropriate.

Additionally, Special Directive 91-6 (see appendix B) provides field direction on interpreting and applying management policy related to NPS use of borrow pits and spoil areas. For example, development of a reclamation plan is necessary before authorizing use of in-park sources of mineral material or continuing use of existing pits. Post-extraction use of the sites also must be defined at the time site disturbance is considered.

The Wilderness Study (NPS 1973) for Yellowstone found ten units totaling 2,016,181 acres of the primitive lands in the park suitable for preservation as wilderness and proposed them for inclusion in the national wilderness preservation system. Wilderness lines usually are drawn on natural features, generally 1/2 to 1 mile back from the principal park road. Borrow pits are not permitted in designated or proposed wilderness areas, with the exception of small quantity use of borrow for trails, which must be in accordance with an approved wilderness management plan.

A Framework for Coordination of National Parks and National Forests in the Greater Yellowstone Area (GYCC 1991) has been issued by the interagency Greater Yellowstone Coordinating Committee. This plan calls for the inventory of existing sand, rock, and gravel material extraction operations in the GYA; limiting material extraction in parks; reclaiming abandoned pits in both forests and parks; and obtaining material from commercial sources where and when practical.

OTHER PUBLIC SECTOR CONSTRUCTION PROGRAMS IN THE GYA

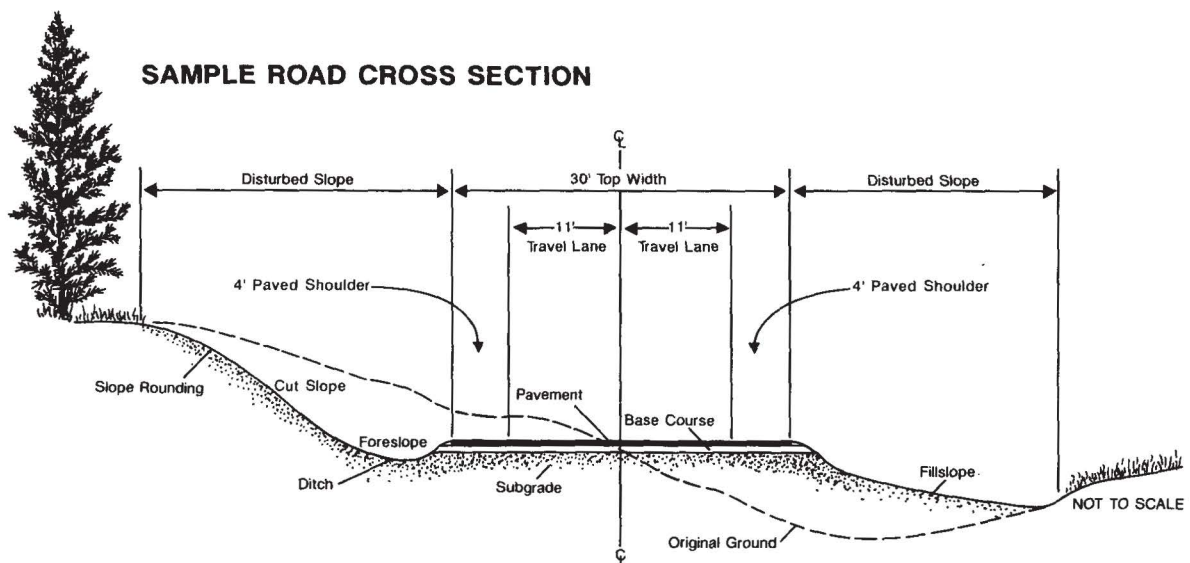
State- and county-maintained roads in the GYA have improvement and maintenance requirements similar to those of park roads, with material needs that are comparable to those of the Park Service. Long-term material sources to supply state and county highway needs have not been identified.

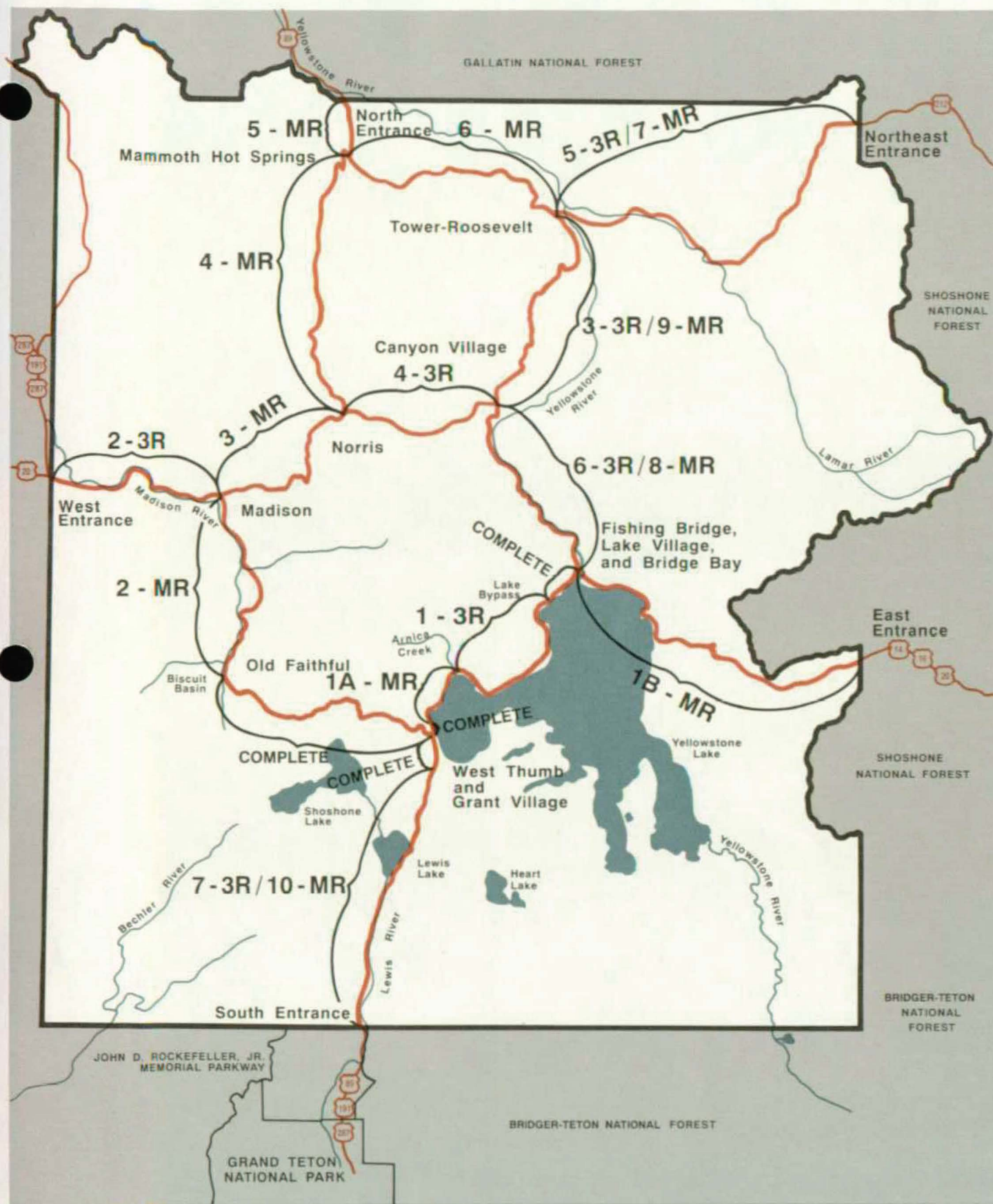
Construction by the Wyoming Highway Department continues on State Route 292 (Chief Joseph Highway) over Dead Indian Pass between Cody, Wyoming, and Cooke City, Montana. Additionally, the Wyoming Highway Department, in conjunction with the U.S. Forest Service (USFS), is preparing an Environmental Impact Statement (EIS) for the proposed reconstruction of the North Fork Highway (US 14/20) west of Cody, from the east boundary of the forest to the east entrance of the park. The two upcoming NPS route-specific road projects, Fishing Bridge to the east entrance and West Thumb to Arnica Creek, will be coordinated with the state's road improvement projects to address issues such as socioeconomics, traffic management, and cumulative effects.

PARKWIDE ROAD IMPROVEMENT PLAN

COMBINED PROGRAM OF 3R AND MR PROJECTS

The plan calls for a long-term schedule of combined road improvement project types as determined by the FHWA in cooperation with the Park Service (see Road Improvement Program map). The *Parkwide Road Engineering Study* (FHWA 1986) provided the basis for formulation of the long-range road improvement program. According to the study's evaluation of principal park roads that exhibit critical functional, structural, or capacity deficiencies, the MR program has been prioritized and integrated with a 3R program. This long-range program is based on eventual reconstruction of most roads, including those treated with 3R. The assigned priority number indicates the order in which both 3R and MR projects will be funded and completed; project start dates and the duration of individual projects will depend on FLHP funding and construction conditions such as weather, existing physical roadway conditions, resource issues, and traffic management. Project priority could change due to future road conditions or funding. The compliance required for each route-specific project is tentatively identified. At this time, no construction of new roads or major realignment of existing roads are planned; however, geotechnical data is still being gathered between Gardiner and Mammoth that could influence final decisions on the road realignment of this segment. Generally, no more than two major projects will be operating concurrently; however, this will be dependent on the availability of funding. The NPS 1984 *Park Road Standards* provide guidelines adaptable to a park's unique character and resource limitations, and provide the framework for design and construction of park roads. Park road design elements include proper roadway width, which may be influenced by numerous factors, including park resource considerations, existing and/or planned volumes and types of traffic, safety, terrain, and design speed. A sample road cross section is illustrated below.





3R- RESURFACING, RESTORATION, AND REHABILITATION

PRIORITY	MILES
1 - Lake Bypass S to Arnica Creek (CX)	3.28
2 - Madison to W Entrance (CX)	13.86
3 - Canyon Village to Tower-Roosevelt (EA)	18.23
4 - Norris to Canyon Village (CX)	11.57
5 - Tower-Roosevelt to NE Entrance (EA)	29.15
6 - Fishing Bridge to Canyon Village (EA)	14.99
7 - S Entrance to Grant Village (CX)	21.45

(CX) - Categorical Exclusion
(EA) - Environmental Assessment Will Be Prepared

MR- MAJOR RECONSTRUCTION

PRIORITY	MILES
1A - Arnica Creek to W Thumb (EA)	3.20
1B - Fishing Bridge to E Entrance (EA)	26.02
2 - Madison to Biscuit Basin (EA)	13.81
3 - Norris to Madison (EA)	13.88
4 - Mammoth Hot Springs to Norris (EA)	20.24
5 - N Entrance to Mammoth Hot Springs (EA)/(EIS)	5.23
6 - Tower-Roosevelt to Mammoth Hot Springs (EA)	18.20
7 - Tower-Roosevelt to NE Entrance (EA)	29.15
8 - Fishing Bridge to Canyon Village (EA)	14.99
9 - Canyon Village to Tower-Roosevelt (EA)	18.23
10 - S Entrance to Grant Village (EA)	21.45

(CX) - Categorical Exclusion
(EA) - Environmental Assessment Will Be Prepared
(EIS) - Environmental Impact Statement May Be Required
If Road Realignment Is Considered



In addition to adding a margin of safety for motor vehicles, widening of road shoulders will also provide reasonable separation of bicycles from motor vehicle traffic. Although separate bikeways are safest, they are impractical because existing road corridors are too narrow and surrounded by sensitive natural and cultural resources.

Most roads will be scheduled for reconstruction while other roads will be maintained at acceptable short-term operational levels by 3R projects. This systemwide approach of reconstructing roads with the most critical need while rehabilitating other road segments for eventual reconstruction will allow continued use of the entire principal park road system.

Road rehabilitation of the 3R type typically entails a pavement overlay of an existing road, minimum excavation, replacement of inferior base material, and case-by-case realignment of dangerous curves and intersections. There will be some disturbance of cut/fill slopes for unsuitable base material excavations (dig-outs), but there will be less impact than with MR. On 3R projects, FHWA standards for road width and curve radius will not always be attainable.

MR projects generally include minor realignment, replacement of base material, shoulder reinforcement, and widening of the existing roadbed. Meetings between the Park Service and FHWA resulted in a preferred road top width of 30 feet where feasible due to significant resource impacts. The recently completed MR of the road segment from Old Faithful over Craig Pass to West Thumb provided the 30-foot top width (11-foot travel lanes, 3-foot paved shoulders, and 1-foot gravel shoulders).

Some housing for construction employees may be provided in existing facilities at developed areas in the park; however, most personnel required for road improvement projects will probably reside outside the park.

MITIGATING MEASURES

Road Design/Construction

Whenever possible, road base widening will be confined to one side with the center line shifted accordingly to avoid important historic or natural features, or large cut and fill slopes along the roadside. Center line shifts will be dependent on existing geometry and will comply with standard safety design principles. Specific road segments will be considered for limits on vehicle size in lieu of major reconstruction to a 30-foot width. In particular, the road segment over Dunraven Pass will be evaluated for vehicle size limits during planning.

Natural Resources

1. Roadbanks and disturbed soil areas will be revegetated by conserving existing topsoil (see appendix C).

-
2. Several mitigation techniques could be used to reduce wetland impacts, including shifting the road alignment, using retaining walls at roadsides, reducing road width through wetlands, and elevating the roadway on piers/pylons.
 3. Several techniques can be used to mitigate the loss of wetlands: reclaim previously filled-in wetlands, create new wetlands, and/or create or restore wetlands in appropriate material sites after material extraction.
 4. Drainage cross-sections will be maintained or enlarged in order not to impact floodplains. Retaining walls will also be used in drainages to reduce amount of fill in floodplains.
 5. Spills from construction equipment will be reduced or prevented from entering waterways through use of barriers in gullies, ditches, and low drainage areas. Possible rockfall hazards will be reduced by the use of intercepting slope ditches, shaped berms, or other means.
 6. Stabilized turf shoulder material will be considered that uses salvaged topsoil or subsoil from within the road corridor mixed with processed aggregates.
 7. Salvaged topsoil will be conserved and replaced in a manner similar to its original condition as soon as possible.
 8. Sediment traps and barriers will be used to avoid excessive sedimentation in streams. Adequate cross-drains will be developed to ensure proper drainage.
 9. Thermal areas within the roadway prism will be accommodated or avoided by road design where possible.
 10. New vehicle pullouts will be planned and located to recognize sensitive wildlife habitat.
 11. Work activities will be scheduled to accommodate critical periods of wildlife use within the road corridor. Important habitat features will be conserved or enhanced where possible.
 12. Techniques and procedures to mitigate possible impacts on threatened and endangered species will be developed on a segment-by-segment basis in consultation with the Fish and Wildlife Service, and followed during construction activities. Similar measures will be used to avoid impacting state-listed species and species of special concern. Avoidance and protection also will be provided for any identified sites of federal candidate plant species.
 13. Construction workers and supervisors will be trained in regard to the special sensitivity of park values, regulations, and appropriate housekeeping and behavior in grizzly habitat.
 14. A park geologist familiar with geothermal resources will assist in planning and design of road segments to avoid adverse effects on these resources.

Cultural Resources

Archeological sites will be avoided wherever possible by road alignment shifts away from the sites. Where this is not possible, some form of mitigation will take place, to be determined on a case-by-case basis. Archeological surveys will be conducted for each segment of the road system before construction takes place. This precedent will continue for all future road segment projects.

If archeological resources prove impossible to avoid, one or more of the following mitigative strategies will be used:

1. Inventory, collect, and excavate artifacts (sites).
2. Test to determine the significance of a buried site.
3. Map and record sites to be buried.
4. Monitor high probability site locations during construction.

The historic values inherent in the road system will be preserved and any adverse effects upon this historic landscape will be mitigated. The use of the road as a transportation corridor has remained the same; however, a historic landscape is not static, but always changing to meet the needs of visitors, to improve with advancing technology, and to meet weather, natural and geologic concerns. The historic landscape seen today does not exist exactly as it was first constructed. Many of the road alignments, width of roads, surfacing materials, guardwalls and guardrails, culverts, and traffic patterns have changed or been altered many times. Despite the fact that the road has had many changes and certainly does not look as it did during the historic period, it is the continuation of the National Park Service design philosophy of harmonizing man-made features with the environment that is important. It is not the road alignment, width of the road, surfacing material, or traffic patterns that are significant, but the historic configuration and the historic landscape as it has evolved. The thrust of this plan, therefore, must be to harmonize these man-made features with the natural environment. Designed features such as log guard railings, stone masonry guard railings, designed pullouts with landscaping features, curbing, and embankments are considered features of the road. The National Register process should be completed by the fall of 1992, and the historic resources formally and officially identified.

In conjunction with the nomination effort, during the summer of 1989, a Historic American Engineering Record (HAER) team recorded the historic bridges and some road sections in the park. All of the historic bridges were photographed to HAER standards and measured drawings were completed for seven of the bridges: Cub Creek, Crawfish Creek, Fishing Bridge, one of the Gibbon River bridges, the Army bridge at the end of the Fountain Freight Road, the Army bridge over Obsidian Creek, and the Gardner River bridge east of Mammoth Hot Springs. If any bridge is to be removed as a result of this plan, the HAER documentation, is complete. It should be noted that nearly all of the wooden guardrail is modern and much of the stone guardrail has been partially or completely reconstructed over the last 110 years. In future route-specific environmental documents, historic features will be indicated on a detailed mapping series provided by FHWA.

The widening of any segment could have an effect on historic resources such as bridges, culverts, masonry retaining walls, embankments, and other historic features close to the road. Effects on any historic features caused by widening could be mitigated, for example, by disassembling masonry portions and reassembling them in the same configuration at their new location. Any new construction or reconstruction should follow the design philosophy of man-made features harmonizing with nature.

All construction employees will receive instruction in regard to the special sensitivity of cultural resources and actions appropriate when cultural resources are encountered.

Two to six months before road construction, personnel from the Cascades Volcano Observatory will measure and place offset marks away from the road but near existing geological benchmarks. After construction, the benchmarks will be relocated on the road by surveying from these offset marks or will be left in the new locations in case of future roadwork.

Socioeconomic Environment

One or more of the following mitigation measures will be employed as necessary and practicable.

1. Work usually will be done on two to three segments of the road system at a time. Scheduling of projects and day-to-day work will minimize impacts on visitors, concessioners, gateway communities, etc. These projects will normally be at opposite sides of the park.
2. Contractual stipulations will be written and enforced regarding beginning and ending dates for construction, hours of work, provision for traffic flows, duration of traffic stoppages, etc.
3. The complete closure of specific routes will be limited to off-season periods and nights unless compelling circumstances warrant otherwise. Daytime traffic flows will be maintained with as little delay as possible.
4. Visitors, concessioners, gateway community members, park staff, employees of other agencies, and others will be informed and consulted about ways to minimize impacts from road improvement projects. A public information program to explain the necessity for road closures, traffic stoppages, etc., will describe the hazards and costs of a deteriorating road system and the benefits of the improvement. An effort will be made to minimize the negative economic impacts to concessioners, members of gateway communities, and others.
5. Coordination with other federal, state, and local agencies regarding the road improvement program would be ongoing.
6. Project-specific mitigation measures will be developed as necessary.

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7. Traffic management plans will be developed for individual road projects to mitigate the disruption to the visitors while allowing for efficient and economical work on the road.
 8. The impacts of accommodating construction personnel within the park, including providing for housing, utilities, and other services, will be minimized; mitigating measures regarding temporary accommodations for construction employees will include, but not be limited to, concentrating their living facilities within currently developed areas of the park or busing them from outside the park to the construction site(s).
 9. Road design will emphasize visual quality while minimizing impacts to resources.

ROAD MATERIAL SOURCES

The plan will use material sources needed for road reconstruction, rehabilitation, and maintenance projects. Sources of quarried stone needed to reconstruct and repair historic masonry features in Yellowstone will also be included. Material sources on public lands and from commercial suppliers will be selected on the basis of resource impact, social impact, and economic cost. The southern Yellowstone area (see Area 3, Road Material Need Areas map) will generally be supplied by material sources on public land (NPS 1991d) and the rest of the park will be supplied by purchase from commercial sources when available or from existing sources and potential sources developed on public land.

The FHWA 1990 study quantified projected road material needs for the long-term improvement plan, including estimates for common borrow, in different areas of the park. Seven "road material areas" were designated to facilitate the analysis of material needs of projects in each area. FHWA material source estimates are based on the long-term need for mineral aggregate surfacing and paving material, the first 10 years of which are based upon MR, 3R, and/or preventive maintenance programs (see table 1 for summary of aggregate, borrow, and waste material quantity estimates). Completion of this road improvement program will reduce future material needs. In addition to park road needs, mineral aggregates for other elements of the park infrastructure (parking areas, visitor use facilities, administrative facilities, building components, drainage installations, sanitary facilities, and erosion control) are included in the estimates.

Management flexibility will be needed for final selection of material sources and quantities of material extracted from each site for each route-specific road project. This flexibility is needed to adapt to changing resource needs/concerns, such as natural, cultural, visitor, and economic resources. Final selection may use few or many of the sources identified by the FHWA, with excavation quantities dependent on the number of sites. Material extracted from existing park sources will only be used for park purposes by either NPS maintenance crews or contractors, in compliance with the NPS management policy discussed earlier.

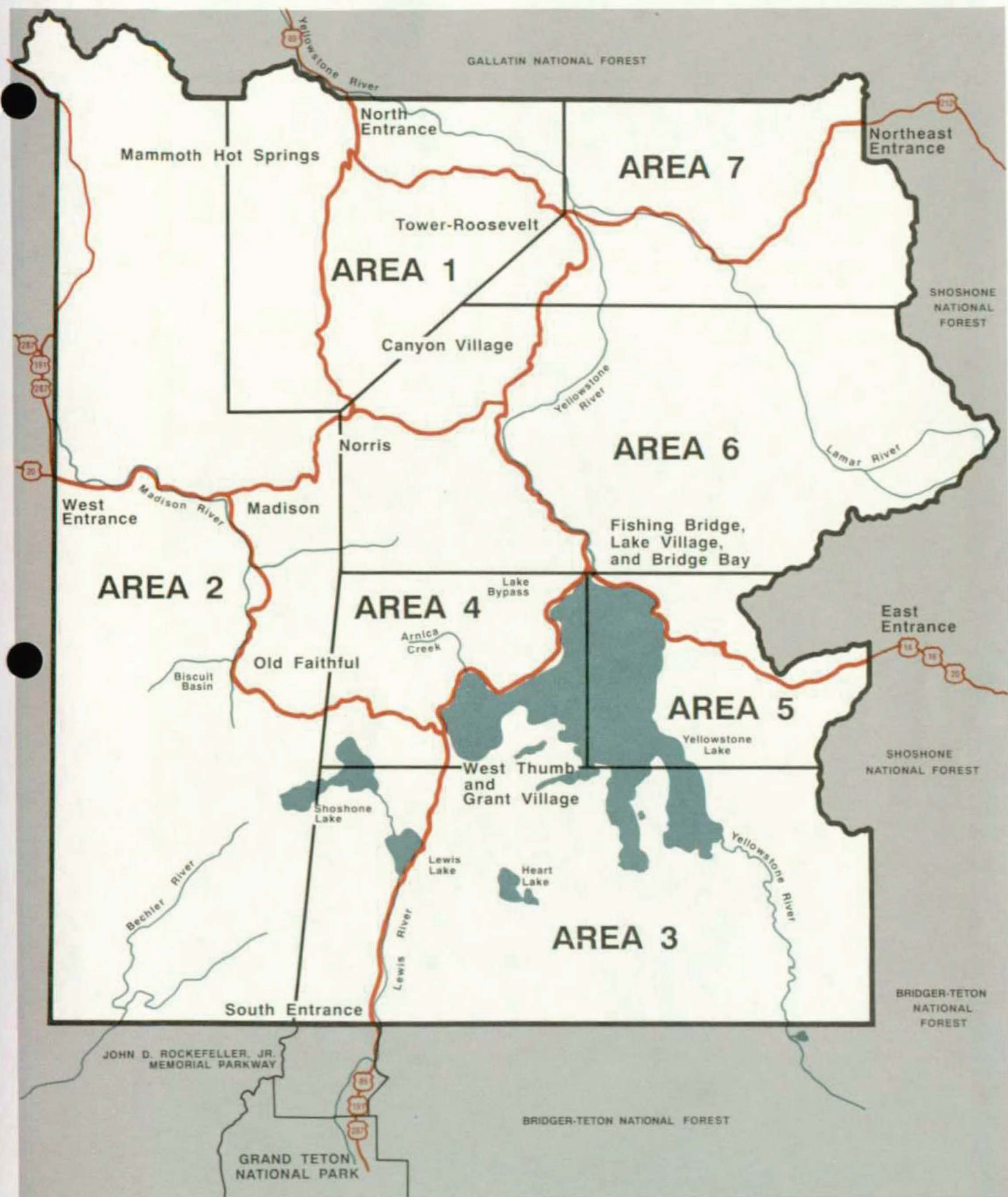
Each material source will be fully evaluated for complete use of a pit, including restoration of the area. Such analysis will often be tied to an environmental document for a specific road segment that initially removes material from the pit. The analysis will address full use of the pit, closure, and restoration, including policy implications and alternative sources.

Material will be excavated, loaded, and transported to a processing plant. The excavation source and processing plant will ideally be located nearby on the same site to reduce transportation cost and improve efficiency. Processing typically consists of crushing, sorting, cleaning, and stockpiling finished aggregate material. Usable finished roadway paving and base-course aggregate material usually represents 50-60 percent of the total raw material processed, with the remainder rejected or wasted. "Waste material" is generally inferior material left over from the crushing operation, old substandard road material that is removed and replaced, and/or overburden from a material site. A portion of the remainder could be useful for purposes other than paving aggregate, such as sanding or utility line bedding material. Rejected fine material will be returned to upland sources for site restoration use if it cannot be used for other maintenance or construction purposes. For pavement projects, the contractor will usually operate a hot-mix asphalt plant at the same site. Hot asphalt will then be hauled to the application point on the road job. Contractor equipment and vehicles will be stored at the site. Staging refers to general contractor activities at the site such as equipment and material storage.

Unless sites are dedicated to long-term maintenance use, material sources and staging areas on public lands will be restored after use as part of the project, with restoration costs funded as a part of road improvement costs. Restoration will consist of removing stockpiled material, regrading to blend with nearby natural landforms, removing access and associated abandoned roads where appropriate, scarifying surface soil, and distributing salvaged topsoil that was initially windrowed (see appendix C). Commercial sources must have restoration plans, and a portion of the royalty fee paid by the purchaser is set aside for eventual site restoration.

The FHWA (1990) *Preliminary Draft Material Source Study* identified existing sites in the study area and estimated potential reserves and engineering quality of material (see appendix A). The majority of the in-park sites are old gravel pits, quarries, or other areas previously disturbed by human activities. Reclamation was minimal due to funding limitations. These sites have varying degrees of plant growth and varying needs for restoration. Some of the abandoned pit sites in the park have been adapted to secondary uses such as administrative or maintenance operations areas, material or equipment storage yards, debris disposal areas, etc. Some sites have been partially or totally reclaimed and blend into adjacent natural resources; however, most show landscape scars that, while hidden from public view, intrude upon and detract from park natural resources. Restoration costs can now be funded with a road improvement project if the site supplies or supports the project. Sources of restoration funding have been very limited in the past. There is potential for developing existing sites inside the park for limited-term material extraction under a preplanned program of reclamation and revegetation with site restoration accomplished at the end of the project. Service roads to the existing material sites may require grading or other minor preparation and upgrading to allow heavy equipment access to sites.

Eleven general areas or specific sites containing reserves of raw mineral aggregate material also were identified on private or public lands outside park boundaries (FHWA 1990). Some of these sites or areas are located up to 20 miles from the park. Efforts were made by FHWA to locate all known previously worked sources of roadway surfacing material outside the park and to evaluate each site for adequate quality and quantity of estimated reserves. Sufficient exploratory work was conducted in road-accessible areas to ascertain the existence



ROAD MATERIAL NEED AREAS

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of suitable new raw material sources. The FHWA did not consider potential source areas more than 20 miles away due to long haul distances, steep grades, and resultant high transportation costs. The USFS and BLM cooperated in identifying these sources, in assessing their availability, and in determining the environmental concerns regarding their use.

Of the 213 existing and potential material sources examined by the FHWA, seven sites were strongly recommended as sources of aggregate and/or for one or more of the following uses: borrow, disposal of waste material, staging, and/or maintenance (see appendix A). The recommended sites are: Soda Butte Creek dry wash, Bridge Bay quarry, Sylvan Pass pit, Snake River pit #2, Nez Perce quarry, Old Fountain Trail pit, and a commercial site in the West Yellowstone area. Following further investigation an additional seven sites were recommended as possible aggregate sources and an additional 22 sites were identified as having potential for aggregate and for one or more other uses.

Potential unspecified commercial sources could be either actual developed sites or commercial sources developed in the future, as market conditions of supply and demand provide incentives for development of private land. Development of new sources and use of existing pits on private lands outside Yellowstone will be regulated by applicable county, state, and federal permits, and permit applications will be the responsibility of the developer and are beyond the scope of this document. The National Park Service is required to comply with section 106 of the National Historic Preservation Act for material sources on private land if cultural resources could be affected.

Special Directive 91-6, on the administrative use of in-park borrow material (see appendix B), provides direction on interpreting and applying the 1988 NPS *Management Policies* related to NPS use of borrow pits and spoil areas (Chapter 9, page 4). A written analysis addressing questions in this directive will be included in environmental documents for future route-specific road projects to assess impacts of road improvement and the use of specific material sources. These questions will apply to material sites in the park and to new and existing sites on public lands outside the park. A more general written reply was included in the draft plan.

SUMMARY OF ROAD IMPROVEMENT MATERIAL NEEDS AND COSTS

The quantities of material needed for Yellowstone road improvement have been estimated by the FHWA for the plan. Table 1 summarizes estimated quantities of aggregate, borrow, and waste material for each of the seven road material areas in the park (see Road Material Need Areas map). The needs for minor roads, parking areas, campgrounds, etc., are incorporated with those for major roads and complexes.

The quantities of common borrow and waste material that will be generated over the long term are extremely difficult to predict, since they are dependent upon the many variable design and geotechnical characteristics of individual road improvement projects, and upon resource management decisions that will be made during the design development process (FHWA 1991a). For example, even small changes in alignment or grade line can have substantial impact upon excavation and embankment quantities. Also, the physical and

chemical characteristics of earthen or rock material affect their suitability as construction material. Soils incapable of supporting the roadway surfacing and pavement structure must be treated or removed and replaced with more competent earthen or rock material. The estimated quantities of needed material contain allowances for wasting unsuitable portions of raw material for the production of mineral aggregates.

The cost of road material is dependent on many factors. The FHWA determined the most significant factors to be the cost of material acquisition (royalty), the cost of processing and placement, and the cost of transportation. Each of these costs are variable. Royalty costs are dependent on the availability of material in a particular area as well as on the competitive condition of the local market. Processing and placement costs include the cost of site preparation, processing plant move-in, installation, operation, maintenance, and equipment amortization. These costs vary depending upon project size, the degree of processing required, labor costs, compliance with environmental regulations, and the costs of site rehabilitation and reclamation. Transportation costs are dependent on numerous factors, including the type of equipment used, hauling distance, condition and gradient of the haul route, load weight restrictions, fuel and licensing costs, and travel time.

Consistent or homogeneous deposits of good quality raw mineral aggregates within or near Yellowstone are rare due to the geologic history of the area. It is anticipated that processing costs will be high and substantial quantities of waste material will be generated in processing (FHWA 1990). A more precise determination of quantities and sources of material and quantities of and sites for future deposition of waste material will be made by the FHWA at the appropriate stage of the design development process for route-specific road improvement projects. New methods such as asphalt recycling could reduce projected aggregate needs; waste figures include an allowance for existing surfacing material of which a portion may be recyclable.

**Table 1: Estimated Material Quantities for Road Improvement in Yellowstone
(FHWA 1991b)**

Road Material Area	Raw Aggregates and Sand Needed (yd³)	Common Borrow Needed (yd³)	Waste Material Generated (yd³)
1	1,413,000	235,000	235,000
2	1,130,000	215,000	215,000
3	618,000	105,000	105,000
4	742,000	65,000	65,000
5	703,000	165,000	165,000
6	733,000	195,000	195,000
7	973,000	240,000	240,000
Subtotal	6,312,000	1,220,000	1,220,000
Total	(for aggregates, sand, and borrow)	7,532,000	1,220,000

MITIGATING MEASURES

Natural Resources

1. Following excavation of material, sites will be recontoured to blend with surroundings and revegetated by conserving existing topsoil (see appendix C).
2. Salvaged topsoil will be conserved and replaced as soon as possible.
3. Work activities will be assessed to minimize the impact on critical periods of wildlife use within and adjacent to material sites. Important habitat features will be conserved or enhanced where possible.
4. Techniques and procedures to mitigate possible impacts to threatened and endangered species will be developed on a segment-by-segment basis in consultation with the Fish and Wildlife Service and followed during extraction activities. Similar measures will be used to avoid impacting state-listed species and species of special concern.

Cultural Resources

Archeological surveys will be considered for road material sources on public or private lands chosen for use in road reconstruction or rehabilitation and these locations will receive clearance in accordance with section 106 of the Historic Preservation Act of 1966 as amended. If significant archeological materials are discovered in conjunction with these sites, they will either be avoided or mitigated by the strategies listed above under the "Plan for Road Improvement."

If a material source on public or private land is identified as being a historic resource or is immediately adjacent to a historic district, the site will either be avoided or clearance in accordance with section 106 of the Historic Preservation Act of 1966 as amended will be completed.

Socioeconomic Environment

Mitigating measures will include those stated in the "Plan for Road Improvement" as well as the following:

1. Road material extraction sites will be utilized in a manner that will not severely impact visitors' recreational experiences, nor imperil visitor safety.
2. Usable sites generally will be visually unobtrusive, taking advantage of natural and man-made screening.

FUTURE COMPLIANCE REQUIREMENTS

Separate route- and design-specific environmental documents will be prepared as needed for each road improvement project in Yellowstone to evaluate the project-specific effects of road improvement and extraction from selected potential material sources and to provide current compliance information. Such environmental documents will be used for application for project-specific permits and compliance.

SECTION 106, NATIONAL HISTORIC PRESERVATION ACT

Under the terms and conditions of the NPS Programmatic Memorandum of Agreement of August 15, 1990, the draft of this plan/EA was submitted for review and comment to the Montana, Wyoming, and Idaho State Historic Preservation Offices (SHPO) as well as to the Advisory Council on Historic Preservation (ACHP). The consultation will be concluded by developing a Memorandum of Agreement that will establish a structure and mechanism for establishing eligibility, determining effects, and providing for mitigation.

When future route-specific projects are funded, the appropriate SHPO will be afforded an opportunity to review and comment on preliminary design drawings and archeological surveys. The National Park Service will ensure that all work is carried out in accordance with *The Secretary of the Interior's Standards for Rehabilitation* and *The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation*. Appropriate mitigation as prescribed by the standards will be completed in consultation with the SHPO.

SECTION 404, CLEAN WATER ACT

Applications for section 404 permits will be made by the FHWA and submitted to the Army Corps of Engineers for future route-specific environmental documents. These permits are required for discharge of roadway fill material into waters of the United States, including wetlands and waterways.

EXECUTIVE ORDERS 11988 AND 11990

Environmental documents will be prepared whenever adverse impacts on floodplains or wetlands could be expected. Environmental documents will be made available for public review for not less than 60 days prior to issuing a Finding of No Significant Impact (FONSI) or a Notice of Intent (NOI) to prepare an Environmental Impact Statement. When the action will involve adverse impacts to wetland or floodplain areas, the FONSI or Final Environmental Impact Statement will be coupled with a separate Statement of Findings (SOF) document.

STORM WATER RULE

The Storm Water Rule (40 CFR, parts 122, 123, and 124) requires a National Pollution Discharge Elimination System (NPDES) permit on certain categories of storm water

discharge. Road construction, such as clearing and grading activities that exceed five acres on an individual road project, will require a NPDES permit.

SECTION 7, ENDANGERED SPECIES ACT

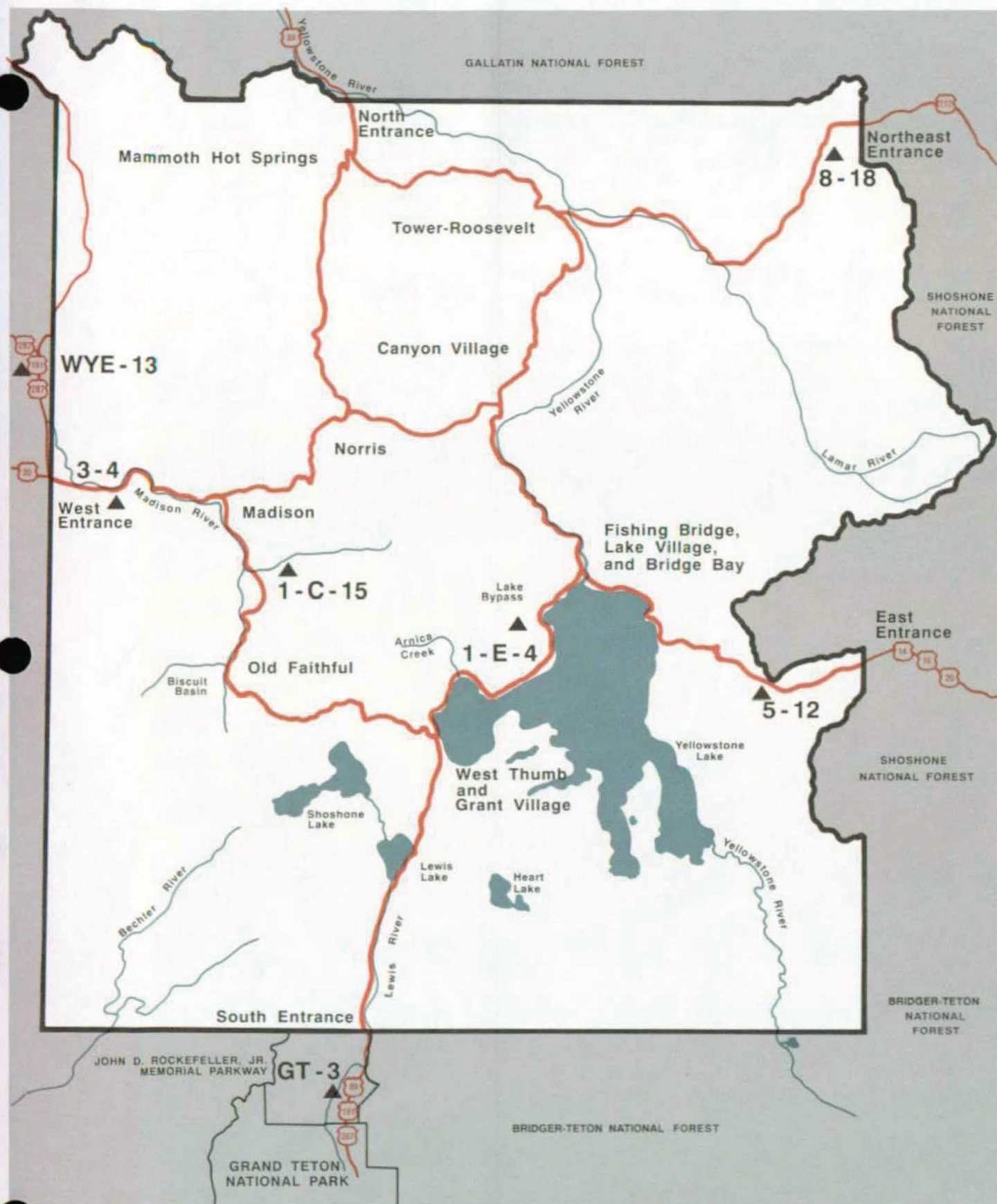
Informal consultation with the USFWS will be initiated by the Park Service on all future road improvements to comply with the Endangered Species Act of 1973, as amended. The National Park Service will coordinate with the USFWS to analyze potential impacts and develop mitigation measures. Formal consultation with the USFWS will be requested if it is determined that the plan is likely to adversely affect any threatened or endangered species.

APPENDIX A: MATERIAL SOURCES

Summary of Recommended Material Sources and Other Uses

Site Name/Number	Estimated Quantity*	Primary Uses	Reasons for Use
Soda Butte Creek dry wash/8-18	60,000 cubic yards	Raw aggregate, common borrow	Area is highly visible and needs reclamation
Bridge Bay quarry/1-E-4	50,000 cubic yards	Raw aggregate, common borrow, waste disposal, staging area	Area is near trail, in sensitive area, and needs reclamation
Sylvan Pass pit/5-12	1,500,000 cubic yards	Raw aggregate, common borrow	Area is highly visible and needs reclamation
Snake River pit #2/GT-3	580,000 cubic yards	Raw aggregate, common borrow, waste disposal, staging area	Area needs reclamation
Nez Perce quarry/1-C-15	750,000 cubic yards	Raw aggregate, common borrow	Highly visible from trails; partially reclaimed pit needs further reclamation
Commercial site in West Yellowstone area/WYE-13	500,000 cubic yards	Raw aggregate, common borrow	Highly visible and needs reclamation
Old Fountain Trail pit/3-4	40,000 cubic yards	Raw aggregate, common borrow, waste disposal	Area needs reclamation

*Quantity estimates are preliminary and primarily based on visual estimates made during the FHWA *Preliminary Draft Material Source Study* (FHWA 1990). The numbers indicate gross quantities; substantial reduction will occur as a result of processing. Substantial changes in these estimates may occur during site testing to determine actual quantity and quality of materials.



SITES ▲	NAME
8-18	Soda Butte Creek Dry Wash
1-E-4	Bridge Bay Quarry
5-12	Sylvan Pass Pit
GT-3	Snake River Pit #2
1-C-15	Nez Perce Quarry
WYE-13	Commercial Site In West Yellowstone Area
3-4	Old Fountain Trail Pit

ON MICROFILM



RECOMMENDED MATERIAL SOURCES AND OTHER USES

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APPENDIX A (Modified from FHWA 1991b)

YELLOWSTONE NATIONAL PARK

QUADRANGLE			NUMBER	NAME	PRELIMINARY RECOMMENDATION				REASON(S) FOR PRELIMINARY RECOMMENDATION												ADMINISTRATION OR OWNERSHIP					
POTENTIAL MINERAL AGGREGATE SITES					USE	NO USE	POSSIBLE USE	MORE INVSTG.	SITE RECLAIMD	NEEDS RECLMATN	POOR QUAL.	SMALL QUANT.	SOURCE DEPLETED	POOR ACCESS	AGENCY DECISN	HIGHLY VISIBLE	SNSITVE AREA	GEOTHRM AREA	PUB USE AREA	ADMIN. AREA	NOT LOCATED	OTHER USE	NPS ADMIN.	FS. ADMIN.	STATE ADMIN.	PRIVATE PROP.
Abiathar Peak	1.	8-9A	Lamar Ranger Sta. R. Pit		X										X	X	X					X	X			
	2.	8-9B	Lamar Ranger Sta. Pit		X										X					X			X			
	3.	8-10	Lamar R. Picnic A. Pit		X										X	X	X		X				X			
	4.	8-11	Trout Lake Pit		X										X	X	X						X			
	5.	8-12	Soda Butte Cr. Tops. Pit		X										X	X	X						X			
	6.	8-13	Pebble Creek Pit		X										X	X	X						X			
	7.	8-14	Pebble Creek Quarry		X										X								X			
	8.	8-15	Soda Butte South Pit				X															X				
	9.	8-16	Soda Butte North Pit		X										X								X			
	10.	8-18	Soda Butte Cr. Dry Wash	X			X			X							X						X			
	11.	8-19	Icebox Canyon		X										X	X	X						X			
Beartooth Butte	1.	CC-9	Lily Lake Site				X																	X		
	2.	CC-10	Ghost Cr. Pit(Muddy Cr.)			X	X			X														X		
	3.	CC-11	Clarks Fork Trlhd. Site		X											X			X					X		
	4.	CC-12	Crandall Park Pit			X				X														X		
Canyon Village	1.	1-E-4	Bridge Bay Quarry	X			X			X							X						X			
	2.	1-E-5	Natural Bridge Pit		X					X			X				X			X			X			
	3.	1-E-6	Lake Incinerator Pit		X					X			X				X			X			X			
	4.	1-F1P	Fishing Bridge #1 Pit		X										X	X	X						X			
	5.	1-F2P	Fishing Bridge #2 Pit		X										X	X	X						X			
	6.	1-F3P	Trout Creek Pit		X				X						X	X	X						X			
	7.	1-F4P	Hayden Valley Pit		X										X	X	X						X			
	8.	1-G-7	Canyon U. Srvc. Rd. Pit		X				X				X							X			X			
	9.	1-G-8	Old Canyon Campgr. Pit		X					X										X			X			
	10.	5-1	Pelican Cr Campgr. Pit		X				X						X		X						X			
	11.	5-2	Squaw Lake Pit		X					X							X						X			
	12.	5-3	Sedge Creek Pit East		X										X	X	X						X			
	13.	5-4	Sedge Creek Pit West		X										X	X	X						X			
	14.	5-5	Old Butte Springs Pit		X					X	X												X			
	15.	5-6	Lake Butte Talus Pit			X	X			X	X									X			X			
	16.	5-7	Lake Butte South		X										X	X	X						X			
	17.	5-19	Fishing Bridge Pit		X				X			X								X			X			
Chimney R.	1.	5-20	Goff Creek Pit		X		X			X	X													X		
Clayton Mt.	1.	5-21	Mummy Cave Pit		X		X				X					X	X							X		
Cliff Lake	1.	WYE-6	Trout Creek Pit			X	X			X												X			X	
Cooke City	1.	CC-1	Cooke City Tailings Pond		X				X		X															X
	2.	CC-2	Cooke City Pit		X					X	X													X		
	3.	CC-3	Lulu Pass # 1			X	X																	X		
	4.	CC-4	Lulu Pass # 2			X	X																	X		
	5.	CC-5	State Line Talus N & S			X	X			X						X								X		
	6.	CC-14	Daisy Pass Road Area		X									X		X								X		
	7.	CC-15	New World Mines			X	X																X			X

MINERAL
AGGREGATE
SITE STATUS
MATRIX (1)

APPENDIX A (Modified from FHWA 1991b)

YELLOWSTONE NATIONAL PARK

QUADRANGLE	NUMBER	NAME	PRELIMINARY RECOMMENDATION				REASON(S) FOR PRELIMINARY RECOMMENDATION														ADMINISTRATION OR OWNERSHIP			
			USE	NO USE	POSSI- BLE USE	MORE INVSTG.	SITE RECLAIMD	NEEDS RECLMATN	POOR QUAL.	SMALL QUANT.	SOURCE DEPLETED	POOR ACCESS	AGENCY DECISN	HIGHLY VISIBLE	SNSITVE AREA	GEOTHRM AREA	PUB USE AREA	ADMIN. AREA	NOT LOCATED	OTHER USE	NPS ADMIN.	FS. ADMIN.	STATE ADMIN.	PRIVATE PROP.
POTENTIAL MINERAL AGGREGATE SITES																								
Cutoff Mountain	1.	8-20 Warm Springs Picnic A.		X							X	X									X			
	2.	8-17 Ranger Res. West Pit		X							X	X		X							X			
Deep Lake	1.	CC-13 Dead Indian Creek Pit		X									X						X			X		
Eagle Peak	1.	5-9 Cub Creek Quarry															X				X			
	2.	5-10 Sylvan Lake North		X								X	X	X							X			
	3.	5-11 Sylvan Lake Pit		X										X							X			
	4.	5-12 Sylvan Pass Pit	X			X							X								X			
	5.	5-13 Sylvan Pass East Pit		X									X								X			
	6.	5-14 Middle Creek Quarry		X								X	X								X			
	7.	5-15 Line Change Quarry		X									X								X			
	8.	5-16 1961 Survey Pit		X									X								X			
	9.	5-17 Service Rd Junction Pit		X									X								X			
	10.	5-18 East Entrance Pit			X	X						X		X							X			
Fridley Pk.	1.	GN-21 Point of Rocks Pit		X						X			X										X	
Gardiner	1.	GN-6 Northern Pacific Pit		X									X								X			
	2.	GN-7 Gardiner Cemetery Pit			X	X							X				X				X			
	3.	GN-8 Laubach Pit		X						X														X
	4.	GN-11 Gresswell Pit		X			X																	X
	5.	GN-15 Jardine Pit		X									X											X
	6.	GN-16 Eagle Creek Pit			X	X					X							X				X		
	7.	GN-17 Phelps Creek Quarry # 1		X				X	X				X						X					X
	8.	GN-18 Phelps Creek Quarry # 2		X				X	X				X						X					X
	9.	GN-19 Jardine Road Quarry		X				X	X				X											X
	10.	GN-20 Gardiner Basalt Pit			X	X							X											X
	13.	GN-24 Little Trail Cr. Site			X	X																X		
Hebgen Dam	1.	WYE-3 Watkins Creek Pit			X	X	X				X											X		
Henrys Lake	1.	WYE-4 Targhee Creek Pit			X	X		X					X										X	
	2.	WYE-5 North Henrys Lake Pit		X				X	X				X										X	
Huckleberry Mountain	1.	4-15 Plateau Trail Pit		X																	X			
	2.	4-16 Lewis R. Gooseneck Pit		X				X						X							X			
	3.	4-17 Old Lewis Canyon Rd Pit			X	X					X										X			
	4.	4-18 Crawfish Creek Pit		X				X									X				X			
	5.	4-19 Lewis-Snake River Pit		X				X				X		X							X			
	6.	4-20 Snake River Bar Pit		X				X						X	X						X			
	7.	GT-1 Dime Creek Pit		X								X		X							X			
	8.	GT-2 Snake River Pit #1		X				X									X				X			
	9.	GT-3 Snake River Pit # 2	X					X									X				X			
	10.	GT-4 Flagg Ranch Site #1		X								X		X							X			
	11.	GT-5 Flagg Ranch Site #2		X								X		X				X			X			
	12.	GT-6 Flagg Ranch Site #3		X								X									X			
	13.	GT-7 Snake R. Ranger Sta Pit		X								X						X			X			

MINERAL
AGGREGATE
SITE STATUS
MATRIX (2)

APPENDIX A (Modified from FHWA 1991b)

YELLOWSTONE NATIONAL PARK

QUADRANGLE	NUMBER	NAME	PRELIMINARY RECOMMENDATION				REASON(S) FOR PRELIMINARY RECOMMENDATION														ADMINISTRATION OR OWNERSHIP			
			USE	NO USE	POSSIBLE USE	MORE INVSTG.	SITE RECLAIMD	NEEDS RECLMATN	POOR QUAL.	SMALL QUANT.	SOURCE DEPLETED	POOR ACCESS	AGENCY DECISION	HIGHLY VISIBLE	SNSITVE AREA	GEOTHRM AREA	PUB USE AREA	ADMIN. AREA	NOT LOCATED	OTHER USE	NPS ADMIN.	FS. ADMIN.	STATE ADMIN.	PRIVATE PROP.
Madison Junction	1.	3-1 Mount Jackson Pit		X				X					X								X			
	2.	3-1A Mt. Jackson Talus Quarry		X				X					X	X							X			
	3.	3-2&3 West Mt. Haynes Pits			X	X		X										X			X			
	4.	3-8 Madison Lagoon Pit		X			X				X							X		X	X			
	5.	1-B-4 Secret Valley Pit		X				X													X			
	6.	1-B-5 Mesa Road Bridge Pit		X								X	X	X							X			
	7.	1-B-6 Tuff Cliff Pit		X									X								X			
	8.	1-B-7 Terrace Spring Pit		X									X		X	X					X			
	9.	1-B-8 Madison Junction Pit		X				X													X			
	10.	1-C-2 Mesa Road Center Pit		X				X			X							X		X	X			
	11.	1-C2A Mesa Burn Pit		X				X			X							X		X	X			
	12.	1-C2B Mesa Maintenance Site		X				X			X							X		X	X			
	13.	1-C-3 Mesa Road West Pit		X										X							X			
	14.	1-C-4 Fairy Falls Ent Rd Pit		X					X					X							X			
	15.	1-C-5 Goose Lake Pit		X					X					X	X						X			
	16.	1-C-6 Hot Lake Pit		X			X		X				X								X			
	17.	1-C-7 Hot Lake Kame Pit		X			X		X				X								X			
	18.	1-C-8 Tangled Creek Pit		X				X	X						X						X			
	19.	1-C-9 S. Ent Firehole Loop Pit		X				X	X						X						X			
	20.	1-C10 Whiskey Flats Pit		X				X	X						X						X			
	21.	1-C11 (& 12) Rabbit Creek Pits		X			X				X		X					X		X	X			
	22.	1-C14 Firehole # 1 Pit		X			X				X							X		X	X			
	23.	1-C15 Nez Perce Quarry	X			X		X							X	X					X			
Mammoth	1.	1-A-1 Swan Lake Talus		X									X	X							X			
	2.	1-A-2 Swan Lake Pit East		X				X			X							X		X	X			
	3.	1-A-3 Swan Lake Flats Pit		X				X					X					X			X			
	4.	1-A-4 Swan Lake Pit West			X	X		X										X			X			
	5.	1-A-5 Apollinaris Spr. S. Pit		X				X	X					X	X						X			
	6.	1-A-6 Semi-Centenn. Geys. Pit		X					X			X			X						X			
	7.	1-A-7 Swan Lake Pit North		X				X						X	X						X			
	8.	1-A-8 Bunsen Peak West Pit		X				X						X							X			
	9.	1-A-9 Glen Creek Site		X									X	X							X			
	10.	1-A10 Upper Mammoth Res. Area		X														X			X			
	11.	1-A11 Upper Mammoth Terrace A.		X									X	X							X			
	12.	1-A12 Indian Creek Campgr. S.		X									X				X		X		X			
	13.	1-H-4 Phantom Lake Pit		X									X								X			
	14.	1-H-5 Frog Rock East Extension		X									X								X			
	15.	1-H-6 Frog Rock Pit			X	X		X	X									X			X			
	16.	1-H-7 Elk Rocks Pit		X				X	X				X					X		X	X			
	17.	1-H-8 Blacktail Patr. Cab. Pit		X				X	X						X			X			X			
	18.	1-H-9 Blacktail Deer Creek		X									X	X	X						X			
	19.	1-H10 Wraith Falls Site		X									X	X	X						X			
	20.	1-H11 Lava Creek Campgr. Pit		X									X	X	X		X				X			
	21.	1-H12 Lava Creek Canyon Talus		X									X	X	X						X			
	22.	1-H13 Capital Hill Pit		X			X							X	X						X			

MINERAL
AGGREGATE
SITE STATUS
MATRIX (3)

APPENDIX A (Modified from FHWA 1991b)

YELLOWSTONE NATIONAL PARK

QUADRANGLE	NUMBER	NAME	PRELIMINARY RECOMMENDATION				REASON(S) FOR PRELIMINARY RECOMMENDATION														ADMINISTRATION OR OWNERSHIP			
			USE	NO USE	POSSIBLE USE	MORE INVSTG.	SITE RCLAMD	NEEDS RCLMATN	POOR QUAL.	SMALL QUANT.	SOURCE DEPLETED	POOR ACCESS	AGENCY DECISN	HIGHLY VISIBLE	SNSITVE AREA	GEOTHRM AREA	PUB USE AREA	ADMIN. AREA	NOT LOCATED	OTHER USE	NPS ADMIN.	FS. ADMIN.	STATE ADMIN.	PRIVATE PROP.
POTENTIAL MINERAL AGGREGATE SITES																								
Miner	1.	GN-1 Reese Creek Pit			X		X														X			
	2.	GN-2 Railroad Wye Pit		X									X								X			
	3.	GN-3 Stephens Cr. Nursery Pit		X													X				X			
	4.	GN-4 Ranger Sta. Entr. Pit		X									X								X			
	5.	GN-5 Stephens Creek Pit		X									X								X			
	6.	GN-9 Pappesh Pit		X				X					X											X
	7.	GN-10 Hoppe Pit		X			X			X			X						X					X
	8.	GN-12 Brogan Pit # 1		X				X		X			X											X
	9.	GN-13 Brogan Pit # 2		X				X		X			X											X
	10.	GN-14 Tom Miner Basin Pit		X				X		X			X											X
	11.	GN-22 Carbella Bar Pits			X	X		X									X			X			X	
	12.	GN-23 Royal Teton Ranch Pit			X	X		X																X
Morris Junction	1.	16-1 Morris Debris Dump Site		X		X		X			X							X		X				
	2.	16-2 Morris Pit & Maint Site		X				X			X							X		X				
	3.	16-3 Ice Lake Quarry			X	X		X										X			X			
	4.	16-4 Virginia Meadows Site		X									X	X							X			
	5.	16-5 Crystal F. Srv. Rd. Pit		X				X			X							X		X				
	6.	1-B-1 Gibbon Meadows Pit		X				X			X										X			
	7.	1-B-2 Gibbon High Cut Pit		X					X				X								X			
	8.	1-B-3 Gibbon Power Line Pit		X					X												X			
Old Faithful	1.	1-C13 Old Faithful Pit		X			X			X								X		X				
	2.	1-D-1 Lone Star Geyser Pit		X				X				X									X			
Pelican Cn.	1.	5-8 Cub Creek Gravel Pit		X				X	X												X			
Pilot Peak	1.	CC-6 Index Creek Bridge Site		X					X					X									X	
	2.	CC-7 Fox Creek Bridge Site		X										X								X		
	3.	CC-8 Pilot Creek Pit						X														X		
Teepee Cr.	1.	WYE-7 Johnson Creek Pit			X	X		X						X										X
	2.	WYE-8 Grayling South Pit		X				X					X	X	X							X		
	3.	WYE-9 Catfish Lane Pit			X	X		X	X	X														X
	4.	WYE10 Grayling Private Pit			X	X		X	X					X										X
	5.	WYE11 Grayling North Pit		X				X					X									X		
	6.	WYE12 Old Cabin Pit			X	X		X	X					X										X
	7.	WYE13 Bozeman Sand & Grav. Pit	X					X	X					X										X
Tower Junction	1.	8-1 Tower Junction Pit		X				X						X			X				X			
	2.	8-2 Junction Butte Pit		X								X									X			
	3.	8-3&4 Little America Pit			X	X		X	X												X			
	4.	8-5 Crystal Creek Pit		X			X					X	X	X							X			
	5.	8-6 Lamar River Quarry		X					X					X	X						X			

MINERAL
AGGREGATE
SITE STATUS
MATRIX (4)

APPENDIX A (Modified from FHWA 1991b)

YELLOWSTONE NATIONAL PARK

QUADRANGLE	NUMBER	NAME	PRELIMINARY RECOMMENDATION				REASON(S) FOR PRELIMINARY RECOMMENDATION														ADMINISTRATION OR OWNERSHIP					
POTENTIAL MINERAL AGGREGATE SITES			USE	NO USE	POSSIBLE USE	MORE INVSTG.	SITE RCLAMD	NEEDS RCLMATN	POOR QUAL.	SMALL QUANT.	SOURCE DEPLETED	POOR ACCESS	AGENCY DECISN	HIGHLY VISIBLE	SNSITVE AREA	GEOTHRM AREA	PUB USE AREA	ADMIN. AREA	NOT LOCATED	OTHER USE	NPS ADMIN.	FS. ADMIN.	STATE ADMIN.	PRIVATE PROP.		
Tower Junction (Cont'd).	6.	8-7	Slough Creek Pit		X				X	X			X									X				
	7.	8-8	Elk Trap Pit		X							X				X						X				
	8.	1-G-1	Mount Washburn Quarry		X					X					X							X				
	9.	1-G-2	Pkng. A. Rd. Jct. Quarry		X					X				X								X				
	10.	1-G-3	Long Curve Quarry		X					X					X							X				
	11.	1-G-4	Tower Falls Quarry		X									X	X							X				
	12.	1-G-5	Tower Falls Pit		X				X	X									X			X				
	13.	1-G-6	Mount Washburn Viewpoint		X					X				X	X							X				
	14.	1-H-1	Elk Creek Pit		X			X														X				
	15.	1-H-2	Yanceys Ranger Sta. Site		X							X		X								X				
	16.	1-H-3	Garnet Hill Pit		X				X	X	X				X			X				X				
	17.	P-H-1	Yancey Creek Site		X									X	X	X						X				
	18.	P-H-2	Elk Creek # 2		X									X	X							X				
	19.	P-H-3	Elk Creek # 3		X								X	X								X				
	West Thumb	1.	4-1	MT Pwr. & Light Camp Pit		X			X			X							X		X	X				
		2.	4-2	Grant Campground Site		X											X		X			X				
		3.	4-3	West Thumb Pwr. Line Pit		X						X								X		X				
		4.	4-4	Dogshead Creek Pit		X					X		X										X			
		5.	4-5	Dogshead Creek West Pit		X					X		X										X			
6.		4-6	Pit West of Old Highway		X					X		X										X				
7.		4-7	Shoshone Lake Trail West		X							X		X								X				
8.		4-8	Riddle Lake Trail W. Pit		X				X	X												X				
9.		4-10	Dogshead Creek Marsh Pit		X					X												X				
10.		4-11	Lewis Lake North Site		X							X		X								X				
11.		4-12	Heart Lake Trail Pit		X				X		X											X				
12.		4-13	Old Lewis L. Campgr. Pit		X				X	X												X				
13.		4-14	Lewis Lake Pit		X				X	X												X				
14.		4-21	Grant Village E. Res Pit		X			X				X							X			X				
15.		4-22	Grant West Pit		X			X				X							X			X				
16.		4-23	Lewis L. W. Campgr. Pit		X			X				X						X				X				
17.		1-D-2	Dry Fk. DeLacey Cr. Pit		X									X	X	X						X				
18.		1-D-3	Continental Divide Pit		X						X				X	X						X				
19.		1-D-4	Little Thumb Cr. N. Pit		X						X		X									X				
20.		1-D-5	Little Thumb Cr. S. Pit		X								X		X							X				
21.		1-E-1	Arnica Creek Pit		X						X					X						X				
22.		1-E-2	Little Thumb Creek Pit		X				X	X						X						X				
23.		1-E-3	Pumice Point Pit		X				X										X		X	X				
West Yellowstone	1.	3-4	Old Fountain Trail Pit	X			X		X													X				
	2.	3-5	Madison R. Lookout Pit		X			X														X				
	3.	3-6	Madison R. Turnout Pit		X				X													X				
	4.	3-7	West Entrance Pit		X				X										X		X	X				
	5.	3-7A	West Entrance Old Pit		X				X	X									X		X	X				
	6.	WYE-1	Madison Plateau Rd Pit			X	X		X														X			
	7.	WYE-2	Madison Arm Road Pit		X				X	X													X			
	8.	WYE14	Airport Pit		X				X	X														X		

MINERAL
AGGREGATE
SITE STATUS
MATRIX (5)

APPENDIX A (Modified from FHWA 1991b)

YELLOWSTONE NATIONAL PARK

QUADRANGLE			NUMBER	NAME	POTENTIAL USE							CONDITION OF SITE										ADMINISTRATION OR OWNERSHIP				
OTHER USES					NONE IDENT.	BORROW SITE	WASTE SITE	TOPSOIL SOURCE	STAGING AREA	MAINT. AREA	SITE RCLAIMD	NEEDS RCLMATN	SOURCE DEPLETED	POOR ACCESS	REMOTE LOCATN.	AGENCY DECISN	HIGHLY VISIBLE	SNSITVE AREA	GEOTHRM AREA	PUB USE AREA	ADMIN. AREA	OTHER USE	NPS ADMIN.	FS. ADMIN.	STATE ADMIN.	PRIVATE PROP.
Abiathar Peak	1.	8-9A	Lamar Ranger Sta. R. Pit	X												X	X	X					X			
	2.	8-9B	Lamar Ranger Sta. Pit	X												X					X	X	X			
	3.	8-10	Lamar R. Picnic A. Pit	X							X					X	X	X		X			X			
	4.	8-11	Trout Lake Pit	X							X					X	X	X					X			
	5.	8-12	Soda Butte Cr. Tops. Pit	X							X					X	X	X					X			
	6.	8-13	Pebble Creek Pit	X							X					X							X			
	7.	8-14	Pebble Creek Quarry	X												X	X	X					X			
	8.	8-15	Soda Butte South Pit	X																			X			
	9.	8-16	Soda Butte North Pit	X							X					X							X			
	10.	8-18	Soda Butte Cr. Dry Wash		X							X					X						X			
	11.	8-19	Icebox Canyon	X												X	X	X					X			
Beartooth Butte	1.	CC-9	Lily Lake Site		X																				X	
	2.	CC-10	Ghost Cr. Pit(Muddy Cr.)		X	X		X	X			X												X		
	3.	CC-11	Clarks Fork Trlhd. Site	X										X			X			X				X		
	4.	CC-12	Crandall Park Pit		X	X		X				X			X									X		
Canyon Village	1.	1-E-4	Bridge Bay Quarry		X	X	X	X	X			X						X					X			
	2.	1-E-5	Natural Bridge Pit			X		X	X			X	X					X			X	X	X			
	3.	1-E-6	Lake Incinerator Pit		X	X		X	X			X						X			X	X	X			
	4.	1-F1P	Fishing Bridge #1 Pit	X												X	X	X					X			
	5.	1-F2P	Fishing Bridge #2 Pit	X												X	X	X					X			
	6.	1-F3P	Trout Creek Pit	X							X			X		X		X					X			
	7.	1-F4P	Hayden Valley Pit	X												X	X	X					X			
	8.	1-G-7	Canyon U. Srvce. Rd. Pit			X					X										X	X	X			
	9.	1-G-8	Old Canyon Campgr. Pit			X		X	X			X	X								X	X	X			
	10.	5-1	Pelican Cr Campgr. Pit			X										X		X					X			
	11.	5-2	Squaw Lake Pit		X	X		X				X						X					X			
	12.	5-3	Sedge Creek Pit East	X												X	X	X					X			
	13.	5-4	Sedge Creek Pit West	X												X	X	X					X			
	14.	5-5	Old Butte Springs Pit									X											X			
	15.	5-6	Lake Butte Talus Pit		X	X		X				X									X		X			
	16.	5-7	Lake Butte South	X												X	X	X					X			
	17.	5-19	Fishing Bridge Pit	X							X										X		X			
Chimney R.	1.	5-20	Goff Creek Pit		X	X		X				X		X										X		
Clayton Mt.	1.	5-21	Mummy Cave Pit		X	X								X			X	X						X		
Cliff Lake	1.	WYE-6	Trout Creek Pit	X					X			X		X								X			X	
Cooke City	1.	CC-1	Cooke City Tailings Pond	X							X															X
	2.	CC-2	Cooke City Pit		X	X						X												X		
	3.	CC-3	Lulu Pass # 1		X	X	X	X																X		
	4.	CC-4	Lulu Pass # 2		X	X	X																	X		
	5.	CC-5	State Line Talus N & S		X							X					X							X		
	6.	CC-14	Daisy Pass Road Area	X										X			X							X		
	7.	CC-15	New World Mines	X																		X				X

**BORROW SITE
WASTE SITE &
STAGING AREA
MATRIX (1)**

APPENDIX A (Modified from FHWA 1991b)

YELLOWSTONE NATIONAL PARK

QUADRANGLE			NUMBER	NAME	POTENTIAL USE						CONDITION OF SITE										ADMINISTRATION OR OWNERSHIP					
OTHER USES					NONE IDENT.	BORROW SITE	WASTE SITE	TOPSOIL SOURCE	STAGING AREA	MAINT. AREA	SITE RECLAIMD	NEEDS RECLMATN	SOURCE DEPLETED	POOR ACCESS	REMOTE LOCATN.	AGENCY DECISN	HIGHLY VISIBLE	SNSITVE AREA	GEOTHRM AREA	PUB USE AREA	ADMIN. AREA	OTHER USE	NPS ADMIN.	FS. ADMIN.	STATE ADMIN.	PRIVATE PROP.
Cutoff Mountain	1.	8-20	Warm Springs Picnic A.	X										X		X							X			
	2.	8-17	Ranger Res. West Pit	X										X		X		X					X			
Deep Lake	1.	CC-13	Dead Indian Creek Pit	X								X			X		X					X		X		
Eagle Peak	1.	5-9	Cub Creek Quarry		X	X		X	X			X									X		X			
	2.	5-10	Sylvan Lake North	X												X	X	X					X			
	3.	5-11	Sylvan Lake Pit		X	X		X				X						X					X			
	4.	5-12	Sylvan Pass Pit		X							X					X						X			
	5.	5-13	Sylvan Pass East Pit	X													X						X			
	6.	5-14	Middle Creek Quarry	X												X	X						X			
	7.	5-15	Line Change Quarry	X													X						X			
	8.	5-16	1961 Survey Pit	X													X						X			
	9.	5-17	Service Rd Junction Pit	X														X					X			
	10.	5-18	East Entrance Pit		X									X				X					X			
Fridley Pk.	1.	GN-21	Point of Rocks Pit	X								X	X		X		X								X	
Gardiner	1.	GN-6	Northern Pacific Pit	X													X					X				
	2.	GN-7	Gardiner Cemetery Pit		X	X		X	X			X					X				X		X			
	3.	GN-8	Laubach Pit	X								X	X													X
	4.	GN-11	Gresswell Pit	X							X															X
	5.	GN-15	Jardine Pit	X											X		X									X
	6.	GN-16	Eagle Creek Pit	X										X	X									X		
	7.	GN-17	Phelps Creek Quarry # 1	X								X					X					X				X
	8.	GN-18	Phelps Creek Quarry # 2	X								X					X					X				X
	9.	GN-19	Jardine Road Quarry	X								X					X									X
	10.	GN-20	Gardiner Basalt Pit	X													X									X
	13.	GN-24	Little Trail Cr. Site		X				X						X									X		
Hebgen Dam	1.	WYE-3	Watkins Creek Pit	X							X			X	X									X		
Henrys Lake	1.	WYE-4	Targhee Creek Pit	X								X			X		X								X	
	2.	WYE-5	North Henrys Lake Pit	X								X			X		X								X	
Huckleberry Mountain	1.	4-15	Plateau Trail Pit	X														X				X				
	2.	4-16	Lewis R. Gooseneck Pit	X								X										X				
	3.	4-17	Old Lewis Canyon Rd Pit		X	X								X	X							X				
	4.	4-18	Crawfish Creek Pit			X		X	X			X									X		X			
	5.	4-19	Lewis-Snake River Pit	X							X							X					X			
	6.	4-20	Snake River Bar Pit	X							X						X	X		X			X			
	7.	GT-1	Dime Creek Pit	X												X		X					X			
	8.	GT-2	Snake River Pit #1			X		X				X									X		X			
	9.	GT-3	Snake River Pit # 2		X	X	X	X				X										X				
	10.	GT-4	Flagg Ranch Site #1	X												X		X					X			
	11.	GT-5	Flagg Ranch Site #2	X												X		X				X				
	12.	GT-6	Flagg Ranch Site #3	X												X							X			
	13.	GT-7	Snake R. Ranger Sta Pit	X												X						X				

**BORROW SITE
WASTE SITE &
STAGING AREA
MATRIX (2)**

APPENDIX A (Modified from FHWA 1991b)

YELLOWSTONE NATIONAL PARK

QUADRANGLE			POTENTIAL USE							CONDITION OF SITE										ADMINISTRATION OR OWNERSHIP					
OTHER USES			NONE IDENT.	BORROW SITE	WASTE SITE	TOPSOIL SOURCE	STAGING AREA	MAINT. AREA	SITE RECLAIMD	NEEDS RECLMATN	SOURCE DEPLTD	POOR ACCESS	REMOTE LOCATN.	AGENCY DECISN	HIGHLY VISIBLE	SNSITIVE AREA	GEOTHRM AREA	PUB USE AREA	ADMIN. AREA	OTHER USE	NPS ADMIN.	FS. ADMIN.	STATE ADMIN.	PRIVATE PROP.	
Madison Junction	1.	3-1 Mount Jackson Pit		X	X		X			X				X							X				
	2.	3-1A Mt. Jackson Talus Quarry	X							X				X	X						X				
	3.	3-2A3 West Mt. Haynes Pits		X	X		X	X		X									X		X				
	4.	3-8 Madison Lagoon Pit	X						X		X								X	X	X				
	5.	1-B-4 Secret Valley Pit		X	X		X			X											X				
	6.	1-B-5 Mesa Road Bridge Pit	X									X		X	X						X				
	7.	1-B-6 Tuff Cliff Pit	X											X							X				
	8.	1-B-7 Terrace Spring Pit	X											X		X	X				X				
	9.	1-B-8 Madison Junction Pit		X	X		X	X		X											X				
	10.	1-C-2 Mesa Road Center Pit		X	X		X	X		X									X	X	X				
	11.	1-C2A Mesa Burn Pit			X			X		X									X	X	X				
	12.	1-C2B Mesa Maintenance Site			X		X	X		X									X	X	X				
	13.	1-C-3 Mesa Road West Pit			X										X						X				
	14.	1-C-4 Fairy Falls Ent Rd Pit	X												X	X					X				
	15.	1-C-5 Goose Lake Pit	X												X						X				
	16.	1-C-6 Hot Lake Pit	X						X					X							X				
	17.	1-C-7 Hot Lake Kame Pit	X						X					X							X				
	18.	1-C-8 Tangled Creek Pit			X						X					X					X				
	19.	1-C-9 S. Ent Firehole Loop Pit	X								X					X					X				
	20.	1-C10 Whiskey Flats Pit		X	X						X					X					X				
	21.	1-C11 (& 12) Rabbit Creek Pits	X						X		X			X						X	X	X			
	22.	1-C14 Firehole # 1 Pit					X	X	X											X	X	X			
	23.	1-C15 Nez Perce Quarry		X							X						X	X			X				
Mammoth	1.	1-A-1 Swan Lake Talus	X											X	X						X				
	2.	1-A-2 Swan Lake Pit East			X		X	X		X									X	X	X				
	3.	1-A-3 Swan Lake Flats Pit			X					X									X		X				
	4.	1-A-4 Swan Lake Pit West		X	X					X									X		X				
	5.	1-A-5 Apollinaris Spr. S. Pit	X							X					X	X					X				
	6.	1-A-6 Semi-Centenn. Geys. Pit	X									X				X					X				
	7.	1-A-7 Swan Lake Pit North			X					X					X	X					X				
	8.	1-A-8 Bunsen Peak West Pit			X					X					X	X					X				
	9.	1-A-9 Glen Creek Site	X											X	X						X				
	10.	1-A10 Upper Mammoth Res. Area	X																X		X				
	11.	1-A11 Upper Mammoth Terrace A.	X											X	X	X					X				
	12.	1-A12 Indian Creek Campgr. S.	X											X				X			X				
	13.	1-H-4 Phantom Lake Pit	X											X							X				
	14.	1-H-5 Frog Rock East Extension	X											X							X				
	15.	1-H-6 Frog Rock Pit		X	X		X	X		X									X		X				
	16.	1-H-7 Elk Rocks Pit		X	X					X				X					X	X	X				
	17.	1-H-8 Blacktail Patr. Cab. Pit		X	X		X			X						X			X		X				
	18.	1-H-9 Blacktail Deer Creek	X											X	X						X				
	19.	1-H10 Wraith Falls Site	X											X	X	X					X				
	20.	1-H11 Lava Creek Campgr. Pit	X											X	X	X		X			X				
	21.	1-H12 Lava Creek Canyon Talus	X											X	X	X					X				
	22.	1-H13 Capital Hill Pit	X							X						X	X				X				

**BORROW SITE
WASTE SITE &
STAGING AREA
MATRIX (3)**

APPENDIX A (Modified from FHWA 1991b)

YELLOWSTONE NATIONAL PARK

QUADRANGLE			NUMBER		NAME	POTENTIAL USE						CONDITION OF SITE										ADMINISTRATION OR OWNERSHIP					
OTHER USES						NONE IDENT.	BORROW SITE	WASTE SITE	TOPSOIL SOURCE	STAGING AREA	MAINT. AREA	SITE RECLAIMED	NEEDS RECLAMATION	SOURCE DEPLETED	POOR ACCESS	REMOTE LOCATION	AGENCY DECISION	HIGHLY VISIBLE	SENSITIVE AREA	GEOTHERMAL AREA	PUBLIC USE AREA	ADMIN. AREA	OTHER USE	NPS ADMIN.	FS. ADMIN.	STATE ADMIN.	PRIVATE PROP.
Miner	1.	GN-1	Reese Creek Pit									X															
	2.	GN-2	Railroad Wye Pit	X														X									
	3.	GN-3	Stephens Cr. Nursery Pit	X																		X					
	4.	GN-4	Ranger Sta. Entr. Pit	X														X									
	5.	GN-5	Stephens Creek Pit	X														X									
	6.	GN-9	Pappesh Pit	X									X					X									X
	7.	GN-10	Hoppe Pit	X								X						X					X				X
	8.	GN-12	Brogan Pit # 1	X									X			X		X									X
	9.	GN-13	Brogan Pit # 2	X										X		X		X									X
	10.	GN-14	Tom Miner Basin Pit	X										X		X		X									X
	11.	GN-22	Carbella Bar Pits	X										X		X										X	
	12.	GN-23	Royal Teton Ranch Pit			X	X							X								X				X	
Norris Junction	1.	16-1	Norris Debris Dump Site				X						X	X								X	X		X		
	2.	16-2	Norris Pit & Maint Site			X	X		X	X			X									X	X		X		
	3.	16-3	Ice Lake Quarry			X	X		X				X						X			X					
	4.	16-4	Virginia Meadows Site	X														X	X								
	5.	16-5	Crystal F. Srv. Rd. Pit				X		X				X	X								X	X		X		
	6.	1-B-1	Gibbon Meadows Pit				X		X				X												X		
	7.	1-B-2	Gibbon High Cut Pit			X												X							X		
	8.	1-B-3	Gibbon Power Line Pit			X	X		X															X			
Old Faithful	1.	1-C13	Old Faithful Pit				X		X	X		X		X								X	X		X		
	2.	1-D-1	Lone Star Geyser Pit	X									X		X									X			
Pelican Cn.	1.	5-8	Cub Creek Gravel Pit			X	X		X				X											X			
Pilot Peak	1.	CC-6	Index Creek Bridge Site	X												X		X								X	
	2.	CC-7	Fox Creek Bridge Site	X														X								X	
	3.	CC-8	Pilot Creek Pit			X	X		X					X												X	
Teepee Cr.	1.	WYE-7	Johnson Creek Pit			X	X						X			X		X									X
	2.	WYE-8	Grayling South Pit	X									X				X	X							X		
	3.	WYE-9	Catfish Lane Pit			X	X						X			X										X	
	4.	WYE10	Grayling Private Pit			X	X						X			X										X	
	5.	WYE11	Grayling North Pit	X									X			X									X		
	6.	WYE12	Old Cabin Pit			X	X						X			X										X	
	7.	WYE13	Bozeman Sand & Grav. Pit			X							X			X										X	
Tower Junction	1.	8-1	Tower Junction Pit				X						X					X			X			X			
	2.	8-2	Junction Butte Pit	X											X									X			
	3.	8-3&4	Little America Pit			X	X						X											X			
	4.	8-5	Crystal Creek Pit	X								X					X	X						X			
	5.	8-6	Lamar River Quarry	X														X	X					X			

**BORROW SITE
WASTE SITE &
STAGING AREA
MATRIX (4)**

APPENDIX A (Modified from FHWA 1991b)

YELLOWSTONE NATIONAL PARK

QUADRANGLE			NUMBER	NAME	POTENTIAL USE						CONDITION OF SITE										ADMINISTRATION OR OWNERSHIP						
OTHER USES					NONE IDENT.	BORROW SITE	WASTE SITE	TOPSOIL SOURCE	STAGING AREA	MAINT. AREA	SITE RECLAIMED	NEEDS RECLAIMED	SOURCE DEPLETED	POOR ACCESS	REMOTE LOCATN.	AGENCY DECISION	HIGHLY VISIBLE	SENSITIVE AREA	GEOTHERMAL AREA	PUBLIC USE AREA	ADMIN. AREA	OTHER USE	NPS ADMIN.	FS. ADMIN.	STATE ADMIN.	PRIVATE PROP.	
Tower Junction (Cont'd).	6.	8-7	Slough Creek Pit			X						X		X									X				
	7.	8-8	Elk Trap Pit	X										X				X					X				
	8.	1-G-1	Mount Washburn Quarry		X												X						X				
	9.	1-G-2	Pkng. A. Rd. Jct. Quarry	X												X							X				
	10.	1-G-3	Long Curve Quarry		X												X						X				
	11.	1-G-4	Tower Falls Quarry	X												X	X						X				
	12.	1-G-5	Tower Falls Pit		X	X						X									X		X				
	13.	1-G-6	Mount Washburn Viewpoint	X												X	X						X				
	14.	1-H-1	Elk Creek Pit	X							X													X			
	15.	1-H-2	Yanceys Ranger Sta. Site	X										X	X	X								X			
16.	1-H-3	Garnet Hill Pit		X	X							X					X			X			X				
17.	P-H-1	Yancey Creek Site	X													X	X	X					X				
18.	P-H-2	Elk Creek # 2	X													X	X						X				
19.	P-H-3	Elk Creek # 3	X										X			X							X				
West Thumb	1.	4-1	MT Pwr. & Light Camp Pit					X	X	X		X									X	X	X				
	2.	4-2	Grant Campground Site	X														X		X			X				
	3.	4-3	West Thumb Pwr. Line Pit	X						X			X								X	X	X				
	4.	4-4	Dogshead Creek Pit	X										X	X								X				
	5.	4-5	Dogshead Creek West Pit	X										X	X								X				
	6.	4-6	Pit West of Old Highway	X										X	X								X				
	7.	4-7	Shoshone Lake Trail West	X										X		X							X				
	8.	4-8	Riddle Lake Trail W. Pit		X	X						X											X				
	9.	4-10	Dogshead Creek Marsh Pit	X																			X				
	10.	4-11	Lewis Lake North Site	X										X		X							X				
	11.	4-12	Heart Lake Trail Pit			X						X										X					
	12.	4-13	Old Lewis L. Campgr. Pit		X	X						X											X				
	13.	4-14	Lewis Lake Pit			X						X											X				
	14.	4-21	Grant Village E. Res Pit	X							X		X								X	X	X				
	15.	4-22	Grant West Pit			X			X	X	X										X	X	X				
	16.	4-23	Lewis L. W. Campgr. Pit						X	X	X		X							X			X				
	17.	1-D-2	Dry Fk. DeLacey Cr. Pit	X												X	X	X						X			
	18.	1-D-3	Continental Divide Pit	X														X	X					X			
	19.	1-D-4	Little Thumb Cr. N. Pit	X										X	X									X			
	20.	1-D-5	Little Thumb Cr. S. Pit	X										X		X								X			
	21.	1-E-1	Arnica Creek Pit	X														X						X			
	22.	1-E-2	Little Thumb Creek Pit		X	X			X				X					X						X			
	23.	1-E-3	Pumice Point Pit		X	X							X									X	X	X			
West Yellowstone	1.	3-4	Old Fountain Trail Pit		X	X						X											X				
	2.	3-5	Madison R. Lookout Pit	X							X												X				
	3.	3-6	Madison R. Turnout Pit		X	X						X											X				
	4.	3-7	West Entrance Pit		X	X		X	X			X									X	X	X				
	5.	3-7A	West Entrance Old Pit		X	X		X				X									X	X	X				
	6.	WYE-1	Madison Plateau Rd Pit	X											X										X		
	7.	WYE-2	Madison Arm Road Pit		X	X		X	X			X													X		
	8.	WYE14	Airport Pit		X	X		X				X														X	

**BORROW SITE
WASTE SITE &
STAGING AREA
MATRIX (5)**

APPENDIX B: SPECIAL DIRECTIVE ON THE ADMINISTRATIVE USE
OF IN-PARK BORROW MATERIAL

AUG 1 1991

L3023 (660)



Memorandum

To: ~~Acting~~ Director

From: Associate Director, Operations (sgd) Willis P. Kriz

Subject: Special Directive on the Administrative Use of
In-Park Borrow Material

Attached for your signature is a special directive which provides field direction on interpreting and applying the 1988 NPS Management Policies related to NPS use of borrow pits and spoil areas (Chapter 9, Page 4). The desire to ensure consistency among parks and avoid potential litigation is the impetus for developing specific field guidance on the administrative use of mineral materials in parks.

This guidance was prepared by a work group consisting of individuals from the Mining and Minerals Branch of the Land Resources Division, Water Resources Division, Denver Service Center, and selected regional offices and parks. A draft of this guidance was reviewed by the regional offices and parks.

If you have any questions regarding this directive, please contact Einar Olsen of the Mining and Minerals Branch at 343-4968.

Attachment

bcc: 100; 190; 500; 600
DEN-Shaver:~~Grasser~~:Higgins:Reading and Project Files
WASO-Kriz:McCoy:Olsen:Reading File
WASO:EOlsen:eo:7/30/91:transmit.mem:343-4968



IN REPLY REFER TO:
A5623(660)

United States Department of the Interior

NATIONAL PARK SERVICE

P.O. BOX 37127

WASHINGTON, D.C. 20013-7127

August 5, 1991



SPECIAL DIRECTIVE 91-6

To: Directorate, Field Directorate, WASO Division Chiefs
and Park Superintendents

From: ~~Acting~~ Director *[Signature]*

Subject: Field Guidance on Implementing the NPS Management Policies Re: Administrative Use of In-Park Borrow Material

This field guidance provides direction on interpreting and applying the 1988 NPS Management Policies related to NPS use of borrow pits and spoil areas (Chapter 9, Page 4). These policies contain several terms that are open to interpretation which could result in inconsistent implementation. The desire to ensure consistency among parks and avoid potential litigation is the impetus for developing specific field guidance on the administrative use of mineral materials in parks. This guidance is not applicable to coastal management issues such as navigation channel dredging, beach nourishment, dune rebuilding and natural levee repair. See NPS Management Policies Chapter 4, page 20, for guidance on shoreline management issues.

Definitions. For the purposes of this field guidance, the following terms are used:

Borrow pit - excavation from which mineral materials are taken.

Extraction or excavation site - a borrow pit or a quarry.

Functions necessary for park administration - actions defined in approved park plans or environmental compliance documents.

Mineral materials - common varieties of sand, stone, gravel, pumice, pumicite, cinders, clay, and common fill.

Spoil - native materials, e.g., soil, rock or overburden

Spoil area - disposal location for overburden or other soil or rock.

Quarry - an open pit or excavation where stone, sand, gravel or other mineral materials are obtained from open faces.

Use of In-Park Sources. In accordance with the NPS Management Policies, park managers should first look outside of parks for sand, gravel and borrow materials. In developing cost estimates for future park projects, park managers should assume that materials will be obtained from sources outside the park. In-park sources should only be considered if the following two tests are met: (1) acceptable sources exist in the park, and (2) economic factors make it totally impractical to import materials.

In determining whether "acceptable sources" exist in the park, park managers must evaluate the natural, cultural, socioeconomic, and visitor use effects of using existing and/or new sites. This guidance sets forth a series of questions that should be addressed in a written analysis evaluating the use of existing and new in-park sites. In the written analysis of new sites, park managers must address the requirements of NPS-12 (NEPA Compliance Guideline), other compliance/permit requirements, and all issues outlined below for existing pit use, including site selection criteria, reclamation plans, and economic considerations.

Potential NPS use of materials from new or existing sites on private lands inside park boundaries should be evaluated using the same process outlined for extraction from federally owned land in parks. This will require specific examination of park planning documents. For areas managed cooperatively as ecosystems, e.g., the Greater Yellowstone Area, resources outside of parks but in the ecosystem should be evaluated using the same criteria as in-park resources, subject to applicable laws.

The definition of "totally impractical" is, by necessity, case-specific. There is no set formula for determining what percentage increase in a project cost makes an outside source totally impractical. The park manager must weigh the expected costs and effects of an in-park source against expected costs and effects of outside sources to determine the acceptability of in-park sources.

Economic considerations to be evaluated for both outside and in-park sources include:

- (1) cost of preparing appropriate planning documents, e.g., mineral source plan, NEPA compliance, technical studies including engineering, hydrologic, or reclamation analyses;
- (2) cost of extraction of materials, and associated transportation, including equipment and labor cost;
- (3) cost of damage to park roads resulting from truck traffic;
- (4) cost of reclamation;
- (5) traffic disruptions;
- (6) health and safety implications of hauling material;
- (7) cost associated with obtaining all State and local permits;
- (8) potential savings of using old extraction sites for administrative purposes;

-
- (9) benefits associated with having previously disturbed sites reclaimed;
 - (10) purchase price of mineral materials (if outside source); and
 - (11) cost of exotic plant management at project site(s) using outside sources, e.g., eradication or long term control, or costs of guaranteeing exotic species-free materials.

Monetary costs may often be greater when using sources outside of the park. However, when comparing the costs of inside sources versus outside sources, park managers should determine whether other funding sources exist which could cover the additional monetary cost of using outside sources, e.g., Federal Highway Administration, and factor that information into the analysis. Also, park managers should evaluate the possibility of extending the project over multiple years to make the use of outside sources economically feasible.

NPS Contractor Use of Borrow Pits and Spoil Areas. For purposes of this field guidance, mineral materials to be used by NPS contractors is the functional equivalent of NPS use. Contractors, including the Federal Highway Administration, performing work for the NPS on park projects may use mineral materials sources in the unit when such use is authorized by the Superintendent. However, the contractor's use of mineral materials, just as direct NPS use, must conform to NPS Management Policies, NEPA, other applicable statutes and regulations, and the criteria outlined herein.

Acceptable Sources Identified in Park Plan. Park management should ensure that acceptable sources for mineral materials are identified and analyzed in appropriate park planning documents and that the effects on natural and cultural resources have been considered and evaluated. Examples of plans in which such sources may be appropriately identified include general management plans, resource management plans, development concepts plans, and mineral materials source studies. If the park has plans for extensive mineral materials extraction, preparation of an areawide mineral materials source study may be appropriate. Planning documents addressing mineral materials sources must include appropriate NEPA and cultural resource compliance and public involvement. Parks should identify sites for extraction and disposal of mineral materials in advance, in anticipation of emergency situations, e.g., road slides, landslides, or floods, in the appropriate planning document. Additionally, managers should be aware that there can be cumulative effects from opening or continuing to use a number of mineral materials sites inside the park. Cumulative effects should be identified and analyzed in appropriate planning and/or environmental compliance documents.

Written Analysis. Any actual or potential in-park use of mineral materials from either new or existing sources requires a written analysis. This analysis shall include: basic site information such as name of pit, map, access, size, location in the park,

relationship to other facilities, and management zoning. Answers to the enclosed questions, along with a determination of acceptability signed by the Superintendent comprise the administrative record for the use of an existing site. The written analysis should be used in determining what constitutes appropriate NEPA compliance, e.g., categorical exclusions, environmental assessments, or EISs. Analyses of new sites must address, in addition to the requirements of NPS-12, all issues outlined herein for existing pit use.

Use of In-Stream Sites. Generally, in-stream sources should not be considered. Stream channels and floodplains are generally recognized as sensitive resources and are not usually suitable as sources for sand, gravel, or borrow. However, under some conditions, use of these areas may result in fewer or shorter-term impacts than alternative upland sources. These sources of borrow may be considered for use when it can be demonstrated through appropriate scientific study that all of the following are met:

- (1) upstream and downstream channel stability will not be affected;
- (2) water quality and aquatic and terrestrial habitats will not be adversely impacted;
- (3) extraction pits can be designed to resemble natural features and function in a manner that does not encourage morphologic or vegetative changes;
- (4) the extraction site will refill with mineral materials similar in characteristics to the removed borrow; and
- (5) replenishment will occur in a reasonable timeframe.

Additionally, when an in-stream source is used, post-extraction monitoring must be conducted to assess the degree to which the above criteria are achieved. No new sources will be established on designated wild or scenic rivers.

Use of Pits In Designated or Proposed Wilderness Areas. Borrow pits are not permitted in designated or proposed wilderness areas, with the exception of small quantity use of borrow for trails, which must be in accordance with an approved wilderness management plan.

Effects on Natural and Cultural Resources. In some cases, active and inactive mining sites may not have had adequate environmental analyses performed at the time of initial disturbance. Consequently, additional environmental analyses should be completed prior to the continued use or reactivation of an existing site. Resource evaluations should include: water, soils, vegetation, fish and wildlife, archeological and historic sites and landscapes. Determination of impacts, including an assessment of their significance and cumulative effects, must be made in accordance with appropriate NPS guidelines. The potential for exotic plants to be introduced, and to spread and persist, should be evaluated

along with requirements for subsequent control.

Effects on Socioeconomic Resources. In evaluating alternative sources of borrow and selecting an actual source, park managers must consider the socioeconomic effects. These include effects on:

- (1) existing local and regional land use patterns and zoning;
- (2) direct and indirect effects on local and regional businesses and residents;
- (3) the local and regional economy;
- (4) other agencies (Federal, State, and local) and their projects; and
- (5) concessions.

The socioeconomic analysis should also address impacts on park operations, e.g., need for additional park staffing, changes in staff schedules, traffic circulation, safety, and security.

Effects on Visitor Experience. The NPS strives to minimize the public's awareness of extraction activities, including the sights, sounds and smells associated with those activities. Extraction sites should not be located in areas of primary visitor use and should not be visible from areas of concentrated visitor use, nor from primary viewsheds. Continued use of existing sites should be evaluated for impacts on visitors and the visitors' experience. Factors to be considered include:

- (1) type and degree of impacts;
- (2) visibility of sites;
- (3) expectation of visitors (wilderness vs. development zones);
- (4) park zoning considerations; and,
- (5) surrounding or adjacent views.

Reclamation. All mineral material sites in park units ultimately should be reclaimed. Park managers should ensure that an adequate reclamation plan is developed before authorizing use of in-park sources of mineral materials or continuing use of existing pits. Post-extraction use of the sites should be defined at the time site disturbance is being considered. This may include returning the area to pre-extraction use, reclaiming the site to be in harmony with surrounding areas, or using the site for administrative purposes, e.g., storage or staging areas. Areas to be used for administrative purposes should be recontoured and reclaimed to the maximum extent possible while still allowing for administrative use. Park managers must consider the cumulative effects of multiple administrative sites in determining appropriate post-extraction uses.

Reclamation plans must address:

- (1) health and safety problems on site;
- (2) control of active sedimentation/erosion problems;

-
- (3) drainage issues;
 - (4) need to recontour (lay back) to allow revegetation;
 - (5) timeframe for achieving reclamation;
 - (6) reestablishment of native vegetation;
 - (7) sources of native plant material;
 - (8) control of exotics;
 - (9) topsoil storage and handling;
 - (10) access;
 - (11) contaminated or hazardous soils; and
 - (12) site monitoring.

Some aspects of reclamation can be most effectively accomplished concurrently with the extraction operation. Control of erosion and exotic species may need to be an ongoing effort. For long-term operations, portions of the disturbed area should be reclaimed as the operations proceed into other areas. All extraction sites developed or reopened for specific projects should be reclaimed within the timeframe of that project.

Park managers are encouraged to provide technical assistance to adjacent land owners in the preparation of reclamation plans where external source development, use, and reclamation could have potential adverse impacts on park resources.

Questions (See the draft for NPS reply.)

In order to implement this guidance, a written analysis addressing the following questions should be prepared. These questions apply to both new and existing borrow pits and spoil areas. A written analysis must be prepared in conformance with the provisions of the NPS Management Policies.

1. What is the proposed project?
2. What type and amount of mineral material is necessary to complete the project?

Evaluating External Sources

3. Are the necessary mineral materials available from sources outside the park?
4. What is the cost to complete this project using mineral materials from outside sources and what are the general environmental impacts?
5. Do economic factors make it "totally impractical" to import materials?
6. What are the pertinent socioeconomic factors at the site and in the affected area?

Evaluating Internal Sources

7. Do previously disturbed sites exist inside the park that provide the quality and quantity of mineral materials needed? [Impact analysis and other environmental compliance documents will be more extensive if the site is new.]
8. Will the extraction operation remain in the existing disturbed area or will it expand onto previously undisturbed lands?
9. How is the site identified and zoned in appropriate park planning and/or environmental compliance documents?
10. What are the characteristics of the proposed extraction operation?
11. What are the natural resources at the site and in the affected area?
 - a. Vegetation, including exotic plants
 - b. Wildlife
 - c. Soils
 - d. Water resources
 - e. Soils and Geology
 - f. Air Quality
 - g. Paleontological resources
 - h. Other
12. What are the cultural resources at the site and in the affected area?
13. What are the impacts to park visitors, and what can be done to mitigate these impacts?
14. What are the impacts to natural and cultural resources, and what can be done to mitigate these impacts?
15. What are the impacts to the socioeconomic resources of the area, and what can be done to mitigate these impacts?
16. Describe how the proposed action could contribute to cumulative impacts over a period of time.
17. Would the action, when added to other past, present, and reasonably foreseeable future actions, have a significant effect?
18. Describe appropriate post extraction use and its consistency with planning documents.
19. Can the site be effectively reclaimed to accomplish the desired post extraction use?

-
20. What are the steps necessary to reclaim this site? Has a reclamation plan been prepared for this site?
21. Have compliance requirements been met?
- a. NEPA
 - b. NHPA, Sections 106 and 110
 - c. Threatened and Endangered Species
 - d. Floodplains and Wetlands, 404 Permits
 - e. State and Local Permits (depending on jurisdiction)
 - f. Air Quality Permits
 - g. Others
22. What is the cost of the in-park source including the mitigation and reclamation measures identified above?

Park Manager Certification

Based on the answers to the above questions, and on analysis of the issues related to the extraction of mineral materials in this project # _____, borrow site _____ (# or name) has been determined as an acceptable site/source. Outside park sources have been evaluated and determined to be totally impractical from a budgetary standpoint. Effects to natural and cultural resources are not significant. Socioeconomic impacts and the effects on visitor use have been analyzed and are deemed to be acceptable. A reclamation plan for the site has been prepared. This action is consistent with all applicable compliance, permitting, and laws.

Superintendent's Signature and Date

APPENDIX C: VEGETATION MANAGEMENT FOR CONSTRUCTION IN YELLOWSTONE NATIONAL PARK

Revegetation efforts within the park have focused on careful management of topsoil as the only available growing medium and seed source. This is based on a park policy that seed obtained from sources outside the park will contaminate the park gene pools. Although it is a conservative method, the topsoil management approach has worked well.

The park has contracted with the Bridger Plant Material Center to assist in the formation of a park seed bank. In the future seed will be available for revegetation work. The park has also tested mulches and can make this information available upon request.

All construction work within the park involving ground disturbance should follow the criteria for revegetation accepted by the park. This includes:

1. All construction will be limited to that area necessary to complete required work. No activity, including vehicle or material use or storage, will be allowed outside the predetermined zone. If vehicles will be traveling through an area numerous times, the same tracks should be used to prevent compaction in other areas. Compacted zones must be treated (raking, aerating, and replacement of topsoil) to assist revegetation.
2. Excavation and improvement will be handled in manageable sections that reflect changes in the soil and vegetation. Trenching routes and disturbance zones will be flagged and approved by the park. All flagging and debris will be removed from the area after work is completed.
3. Sections will be rehabilitated as soon as possible. Topsoil may not be stockpiled over the winter or for longer than three months in sage brush/rabbit brush zones nor longer than six months in grass-dominated zones. Any deviation will be approved by the park.
4. Topsoil refers to the uppermost soil horizon. It is usually found in the top 2-6 inches. Topsoil will be removed and replaced from the same area. Care will be taken to ensure that topsoil and fill material are not mixed and are stockpiled in separate areas (i.e. topsoil to the right of the trench and fill to the left).
5. Vegetation over three feet in height must be removed prior to the removal of topsoil. Such vegetation shall be removed in a manner that least disturbs the topsoil. Topsoil may not be driven on, gouged, or compacted as vegetation is removed. Topsoil shall be removed before stumps are pushed. Any deviation from this process will be approved by the park.
6. After large trees are removed, topsoil will be removed from an area in a single cut including any vegetation that is three feet tall and under. Grubbing is not permitted.
7. Irregular land surfaces are recommended for a natural effect. Some rock outcropping and boulders could be left in place to create natural pockets for revegetation (see number 11). Deadfall snags could be stockpiled for later use on slopes that are very steep to provide catch points for soil.
8. Topsoil may not be used as bedding material. Separate bedding material will be obtained from sources approved by the park.
9. Topsoil will be replaced on site in a mixture of topsoil and vegetation associated with the topsoil, and will be reworked over the site in a manner that preserves the seed source while spreading the soil over the area.

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10. No topsoil will be imported from outside the park or moved internally within the park unless approved by the park. Any imported fill will be checked for exotic plants.
 11. Trees and shrubs are to be avoided if possible during trenching or excavation. Any trees removed during construction should be removed from the site unless specified by the park.
 12. If replacement seed is required for revegetation in an area, the park will provide seed at cost to the contractor. Advance notice of six months to one year is required on projects exceeding 1,000 square feet.
 13. Boulders unearthed during construction will be reburied or left exposed (with lower third buried) depending upon the location and extent of rock naturally occurring in the area.
 14. The surface of the trench will be left mounded to allow for settling along the line.
 15. If mulch is required in sensitive areas due to visibility or exotic plant infestation, the park will specify the type and depth of mulch to be used. Nitrogen will be added in small quantities to any wood product used on slopes to balance nitrogen lost through decomposition.
 16. No fertilizer will be used in any revegetation work unless requested by the park.
 17. If relocated due to road reconstruction, junction boxes or cans will be placed in the field and approved by the park. Location should be well screened by vegetation, topography, or large boulders.
 18. All access to the site and stockpiling or staging areas must be identified by the contractor and approved by the park. These areas shall be revegetated using approved techniques upon the completion of the project.
 19. All debris shall be removed from the site to an approved pit or hauled away as approved by the park.
 20. Final review and inspection shall be made by the park before the work is accepted.

APPENDIX D

SUMMARY OF COMMENTS AND RESPONSES, PARKWIDE ROAD IMPROVEMENT PLAN/ENVIRONMENTAL ASSESSMENT

A total of 10 comments on the Parkwide Road Improvement Plan Environmental Assessment were received during the public review comment period, March 15 through April 15, 1992. These comments include three individual responses and seven organizational and official responses: BIKE Centennial, Wyoming Public Service Commission, Greater Yellowstone Coalition (GYC), National Parks and Conservation Association (NPCA), Wyoming Game & Fish, The Geologic Survey of Wyoming, and the Wyoming Department of Commerce Division of Parks and Cultural Resources.

Specific concerns with the plan were expressed by GYC and NPCA. These are summed up by GYC: "A clearer, more comprehensive parkwide evaluation of the potential effects of this plan on . . . increased visitation, increased traffic, faster speeds, and development of material source sites is warranted in this document. Such a broad, cumulative effects analysis will not necessarily be provided in the site-specific environmental reviews."

Specific, significant issues included the following:

Road Design

- 1) The proposed improvements to the road system could increase the volume and speed of traffic through the park. Mitigation measures such as speed bumps or dips where appropriate should be included in the plan.
- 2) NPCA feels that wider roads will have visual and aesthetic impacts on the visitors. While improved roads may be easier to drive, they may also dominate visitor's visual experiences.
- 3) NPCA believes minimal guardrails should be used where not mandatory by federal and state regulations.

Response:

The proposed 30 foot wide road design meets National Park Service park road standards for the average daily traffic loads in the park. Eleven foot lanes with four foot shoulders provides a reasonable width that can accommodate both vehicular and bicycle traffic. Although the shoulders are not wide enough to meet bike lane standards, they are a vast improvement over the current 22 to 24 foot wide roads with no shoulders.

Traffic speed control devices such as speed bumps or dips can create significant safety problems and are not utilized on public roads.

Properly designed and constructed wider roads need not be more visually intrusive than a narrower road. The ease of driving the roads should improve the visitor experience and make it easier to enjoy the park.

Guardrails will be limited to the minimum necessary to meet NPS safety standards. Design alternatives at specific locations, such as wider shoulders, will be evaluated in lieu of guardrails. At Craig Pass, for example, the length of guardrail along the road is the minimum necessary to allow FHWA funding of the project and represents about half of the original design.

Vehicle Limitations

Glacier National Park recently implemented a plan to restrict certain vehicle widths and lengths from using the Going-to-the-Sun Road after 1994. GYC and NPCA feel this is also necessary in Yellowstone to improve safety, to reduce road degradation, and to enhance visitors' views.

Response:

We concur that vehicle limitations should be evaluated as an alternative for specific road segments. For example, limiting the size of vehicles over Dunraven Pass would be evaluated as an alternative to reconstructing that segment of road to a 30 foot width. However, the poor quality of the existing road structure (surface, base, and subbase) through much of the park requires that major reconstruction of the existing road prism occur even if vehicle sizes are limited.

Long-term Planning

The EA does not address how road improvements will fit into the long-term transportation plan of Yellowstone National Park. There is no discussion in this document of traffic problems and alternatives to the private automobile.

Response:

Public Law 102-240 requires that a study of alternative modes of transportation be accomplished for Yellowstone as well as for Yosemite and Denali National Parks. That study is underway and due to be completed by December 1992. The road improvement plan will stretch over at least 20 years at current funding levels. If the study results appear promising, future, specific projects can begin to be tailored to accommodate alternative systems. In the meantime however, following the current transportation study, it is expected that a more detailed, site-specific analysis will be required before implementation of any alternative system occurs. Even with an alternative system, some mode of automobile and truck access will be required to developed areas of the park to serve administrative and concessionaire needs. Plus it is expected that the rapidly deteriorating roads will require reconstruction before they could be supplemented by an alternative transportation system.

Material Source Management

- 1) The document lists potential material source sites within and outside the park, but no details are listed as to what each site will be used for and how much disturbance will occur in these areas. Furthermore, the document is unclear as to whether or not new source areas within the park, not listed in the document, will be developed. The document implies that these decisions will not be made until specific road project environmental documentation is complete. However, NPCA believes that the plan implies that certain decisions have been made (for example, to use 1.4 million cubic yards of materials from Sylvan Pass). They would like the document to clarify what decisions on material sources have been made.
- 2) NPCA believes material source sites should not be limited to those within 20 miles of the park boundary until a cost comparison is completed between acquiring materials from areas further than 20 miles from the park border and mining and processing materials from sites within the park and then reclaiming the sites. They cite Special Directive 91-6 in support of their argument.
- 3) NPCA feels that to properly assess environmental and cumulative impacts to material sources, an area-by-area assessment rather than assessment by road segment needs to be completed.

-
- 4) NPCA wants reclamation plans for the material source site areas to be addressed more fully. They state that it must not be assumed that healthy topsoil is present in the area. Many disturbed sites may have little to no topsoil for use in reclamation. The reclamation plan should also take into consideration the costs of monitoring the rehabilitation and revegetation activities and also the costs to restart those efforts if they fail the first time.
 - 5) Some of the material source sites may conflict with NPS Management policy. NPCA states that the Snake River Pit is a floodplain and the area has been frequented by a female grizzly. The Soda Butte Creek Dry Wash site and the Sylvan Pass Pit are areas which are highly visible to visitors. GYC is also concerned about use of the Snake River Pit, the Bridge Bay Quarry, and the Nez Perce Quarry with relation to wildlife, geothermal impacts, and wetlands.

Response:

One of the purposes of the parkwide road improvement plan is to conceptually identify the sources of material that would be required to accomplish the projects. The preliminary materials study accomplished by the Federal Highway Administration confirmed that the quantity of good quality rock (raw aggregate) in the Yellowstone area is limited. The seven sites represent the most suitable and feasible sources of raw aggregate identified in the FHWA study. The other 29 sites identified by FHWA as being potential sources of raw aggregate will require further analysis before they can be recommended for use. As required by Council of Environmental Quality regulations implementing NEPA, these seven sites represent the preferred alternative for sources of raw aggregate for the parkwide road improvement project.

Sources more than 20 miles outside the park were not considered practical due to the high cost of hauling material. However, a contractor would not be prohibited from utilizing a source more than 20 miles outside the park.

The final plan has been modified to indicate that all material sites will receive more specific analysis that will address full use of the pit and complete reclamation. Although such analysis may be tied to specific projects, which only use a portion of the pit's volume, the analysis will be comprehensive for the pit. Policy implications along with alternative sources will be included in the analysis.

Other Concerns

- 1) BIKE Centennial suggested that 12-foot travel lanes with four-foot paved shoulders would provide the best travel-ways for bicyclers. They support the retention of historic bridges, with appropriate signing to warn bikers and motorists of the narrowing roadway.

Response:

As noted above, a total structural width of 30 feet meets NPS road standards for current traffic volumes. The plan has been modified to indicate the unpaved, one foot structural shoulders would be paved, bringing the paved shoulder to four feet. The overall structural road width remains at 30 feet.

- 2) The Public Service Commission would like the Park Service to coordinate with them to avoid damage to utilities. If utility facilities are to be moved, the Park Service should be responsible for paying the costs.

Response:

Coordination with utilities will occur.

- 3) Any potential impact to geothermal features needs to be detailed.

Response:

Park geologists familiar with geothermal features will be involved with route specific planning and design.

- 4) Concern was expressed that archeological/cultural resource surveys be completed as soon as possible.

Response:

Archeological surveys will be accomplished as soon as a project is identified and funded for planning and design.

- 5) Will construction crews be housed in existing facilities or will additional residences need to be built?

Response:

Construction personnel are allowed to stay at existing employee trailer sites on a space-available basis. All other construction personnel are required to live outside the park.

AGENCIES/ORGANIZATIONS CONTACTED DURING THE REVIEW OF THE DRAFT PLAN/EA

Advisory Council on Historic Preservation
Bozeman Area Chamber of Commerce
Cody Economic Development Council
Cooke City Chamber of Commerce
Dubois Chamber of Commerce
Gardiner Chamber of Commerce
Greater Idaho Falls Chamber of Commerce
Idaho State Historic Preservation Office
Jackson Hole Chamber of Commerce
Livingston Chamber of Commerce
Montana State Historic Preservation Office
Red Lodge Area Chamber of Commerce
U.S. Army Corps of Engineers
U.S. Forest Service
U.S. Fish and Wildlife Service
West Yellowstone Chamber of Commerce
Wyoming State Historic Preservation Office

APPENDIX E: FINDING OF NO SIGNIFICANT IMPACT

Finding of No Significant Impact Yellowstone National Park

Environmental Assessment Parkwide Road Improvement Plan

In accordance with the provisions of the National Environmental Policy Act of 1969 and the regulations of the Council on Environmental Quality, 40 CFR 1508.9, the National Park Service prepared an environmental assessment regarding a Parkwide Road Improvement Plan.

Four alternatives were discussed for road improvement: the proposal; no action; resurfacing, restoration, and rehabilitation only; and major reconstruction only. Three alternatives were discussed for material sources: the proposal; no action; and sources from outside the park only.

The Environmental Assessment was made available for public review from March 15 through April 15, 1992. A total of 10 comments were received from the following organizations and individuals: BIKE Centennial, National Parks and Conservation Association, Greater Yellowstone Coalition, Wyoming Game and Fish Department, The Geological Survey of Wyoming, State of Wyoming Public Service Commission, Wyoming Department of Commerce Division of Parks and Cultural Resources, Joseph Kruzic, Guy Higbee, and Jay Hedrick. Major concerns included the potential effects of road improvement on increased visitation, increased traffic, and faster speeds; lack of adequate bicycle lanes; and development of material source sites.

The National Park Service proposes to implement the parkwide road improvement plan. Over the next 20 years, much of the principal park road system would receive major reconstruction. Segments which have reasonably good road structures would receive resurfacing, restoration, and rehabilitation. Material for use in road improvement would come from a variety of in-park and out-of-park sources.

Major modifications to the plan as a result of public comment include: vehicle size limits will be evaluated as an alternative for specific road segments; all material sites will receive more specific analysis addressing full use of a pit and complete reclamation; the one-foot unpaved shoulders will be paved; and park geologists will assist in planning and design of road segments to minimize effects on thermal features.

Unavoidable adverse effects from implementing the parkwide road improvement plan include disturbance of a strip of terrain, vegetation, and wildlife habitat along each reconstructed road segment; Restrictions on all traffic, including entire road closures late in the season, will inconvenience and delay visitors and employees; Heavy truck traffic hauling material through the park will be aggravating to visitors

and employees, and more rapid deterioration of road segments may occur as a result; continued disturbance of terrain, vegetation, and wildlife habitat would occur at material sources during their period of use; and some in-park sources of material would be used to implement the road improvement plan.

Plans for specific road segments would be reviewed with the U.S. Fish and Wildlife Service for consultation with Section 7 of the Endangered Species Act. Similarly the appropriate state historic preservation office would be consulted for compliance with Section 106 of the National Historic Preservation Act. The need for U.S. Department of the Army permits under Section 404 of the Clean Water Act would be made on a specific road segment basis.

The parkwide road improvement plan does not constitute an action that normally requires preparation of an environmental impact statement. The plan will not have a significant effect on the human environment. Negative environmental impacts that could occur are minor and temporary in effect. There are no unmitigated adverse impacts on public health, public safety, threatened or endangered species, sites or districts listed on or eligible for listing in the National Register of Historic Places, or other unique characteristics of the region. No highly uncertain or controversial impacts, unique or unknown risks, cumulative effects, or elements of precedence were identified. Implementation of the action will not violate any federal, state, or local law. Based on the foregoing, it has been determined that an environmental impact statement is not required for this project and thus will not be prepared.

Recommended: /s/ Joseph F. Alston
Acting Superintendent, Yellowstone National Park

06/03/92
Date

Approved: 
Regional Director, Rocky Mountain Region

6/10/92
Date

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As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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