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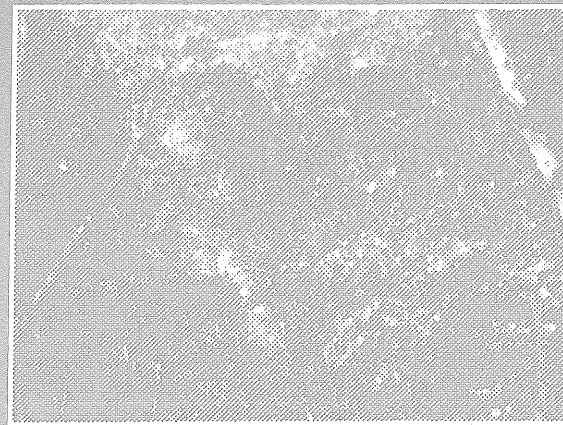
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- State forest road manual.



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# State Forest Road MANUAL



Division of Forestry  
MINNESOTA DEPARTMENT OF  
NATURAL RESOURCES  
1994



# STATE FOREST ROAD MANUAL

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Minnesota Department of Natural Resources  
Division of Forestry

# STATE FOREST ROAD MANUAL

## A. INTRODUCTION

## STATE FOREST ROAD MANUAL

### INTRODUCTION

#### A. PURPOSE

The Forest Road Manual will provide a comprehensive source of technical guidelines and administrative procedures necessary to manage the state forest road program. The main purposes are to provide:

1. Uniformity in administration and management of the Division's Road Program.
2. Expertise to formulate road designs and specifications within the construction program.
3. Proficiency to manage an effective maintenance program.
4. Expertise to write and enforce road contracts.
5. Road and program standards.
6. Guidance on using technical expertise outside the Division.

This manual will not answer all questions and issues regarding management of the road program. The guidelines and policies will provide the basis for management decisions regarding the State Forest Road Statutes.

#### B. INTENDED USERS

Primary users of this manual are the Division's field foresters. It will give them quick access to laws, policies and guidelines governing the Forest Road Program.

This manual will also be useful to Division Program managers and supervisors. The recommended practices and guidelines will provide standards to measure performance. The reporting and administrative guidelines will insure application of uniform reporting and administrative procedures. Anyone interested in the Division's State Forest Road Management activities will find this manual a useful source of information.

#### C. UPDATING PROCEDURES

Road Program administrative procedures will change over time. The Forest Road Manual must be kept current to reflect such changes. The following procedure will be used to keep the manual current:

1. The Division Forest Roads Coordinator is responsible for Manual maintenance.

## STATE FOREST ROAD MANUAL

Suggestions for revisions or additions should be directed to the Regional Roads Specialist. This manual will be reviewed at least annually by the Forest Roads Coordinator and other Division personnel to see if changes are needed. Manual revisions will be written as needed.

2. Manual revisions will be mailed to all stations.
3. Forest Road Manual owners will file revisions in the manual upon receipt, and record them on the back of the title page.

## STATE FOREST ROAD MANUAL

### STATE FOREST ROADS PROGRAM

#### SCOPE

The Division of Forestry maintains 2,064 miles of state forest roads providing access to 4.6 million acres of forest lands administered by the Division of Forestry. These roads also provide access to millions of acres of federal, county and private forest lands. Many of these roads were constructed by the Civilian Conservation Corps (CCC) in the 1930's, and later improved through timber harvesting and fire protection activities. Today some 2,500 loggers and 15 major wood-based industries benefit from these roads. A recent study conducted by the Division and the Department of Transportation showed recreational use contributed 97% of the traffic on the road system. It also found that almost 15 million miles of public travel occurs annually on state forest roads for recreation and other purposes.

#### ACTIVITY DESCRIPTION

The following are the major activities of the state forest road program:

- A. Inventory the transportation system to provide a basis for program decisions.
- B. Maintain existing transportation facilities in good condition.
- C. Reconstruct bridges and roads to meet required standards.
- D. Plan for constructing new access for the protection, management, and use of forest resources: using the most cost effective means available.
- E. Manage the transportation system by developing policies and procedures: reviewing regional programs and projects: and reviewing regional and area Transportation Plans.

#### GOAL

Identify, develop, and maintain a safe and efficient forest transportation system that provides access to Minnesota's forest resources.

#### STATE-WIDE DIRECTION

Cooperative transportation planning on an area and division scale will comprise most of this program. Key parts of the plans are based on knowledge and projected use of all resources. This will include coordination with other resource managers at field levels. An analysis of needs based on existing facilities, resource use, costs and available funding are completed for each project. Road management training is directed at specific groups to provide them the most useful information. Emphasis is placed on bridge safety and maintenance of recent improvements. Substantial under funding of this program

continues to plague the transportation system. Public demand to use the roads for pleasure driving, berry picking, hunting and other recreational uses is expected to increase. Restrictions may have to be placed on use due to funding limitations. Summer access for management and timber harvesting is also greatly affected. Continued under funding will effect the volume and value of timber resources the Department can sell, even in a competitive market. Wildlife habitat manipulation will also be severely restricted in some areas.









**B. ACCESS AGREEMENTS**

## STATE FOREST ROAD MANUAL

### PERMITS FOR ROAD USE TO BE ISSUED BY FORESTRY

TYPE	APPLICANT	ISSUING AGENT	PURPOSE
Resource Management Access	Government agency Forest Industry, NIPF owners	Area Forester	To allow for temporary access across state land for resource management purposes. Under development with AGO.
Seasonal Access	Logger or General Public	Area Forester	To allow restricted access on a selective basis. May be used to protect the road or other resources. Often used in spring to permit use when conditions will allow use without damage. - Needs further development. See suggested forms.
Special Events	User	Area Forester/ Regional Forest Manager	Used for special events or uses (road rally). Requires a deposit to cover performance of maintenance or repair of damage. Assess the potential long term damage carefully - the loss of gravel may only appear as a problem 2 or 3 years later.
Road Lease	User	BREM	For mid to long term use of a road by private individuals.
Road Easement	Government Agencies	BREM	Long term use of a road for many purposes - commercial access, private driveway, public road, access to agency land.

## ACCESS ACROSS LANDS OF OTHERS

The Division of Forestry's land ownership is inter-mixed with other public and private lands in many areas of the state. This requires obtaining access across other ownerships to access state lands. Many types of access can be acquired based on the needs for a specific project. Costs of obtaining the access will vary based on the type of access. Legal rights, time periods, types of use allowed may also vary based on the specific project. It is desirable to acquire a legal access for all DNR activities.

Legal access from other government agencies can be easy to get if we have a Reciprocal Access Agreement with the agency or private landowner. See the policy section for more information. Reciprocal access agreements set up a formal process for obtaining access from government agencies or private landowners and spell out what type of access can be obtained from the landowner.

Another way to guarantee access is through a cooperative road agreement with another agency that spells out the State's and the other Agencies rights and commitments in regard to use of a specific road or roads.

Access to private industrial lands can be more difficult to acquire if we do not have a Reciprocal Access Agreement in place. In some instances industrial landowners are not be willing to grant permanent easements to the state. In these instances informal short term access agreements or licenses may be the only type of agreement we can get to use industrial lands. While less desirable, informal agreements are satisfactory if the industrial landowners are not territorial about who can use the roads to access state lands.

Crossing NIPF lands presents the greatest concern for long term access. These lands are most likely to be bought and sold or the owner may change his/her mind about granting the state access. For these reasons NIPF lands require the most formal types of access. Easements, even temporary ones, are the best instruments for acquiring access across NIPF lands. Easements are recorded on the landowners deed and stay with the land if ownership changes. Other less permanent agreements should only be used if the NIPF landowner is not willing to grant permanent access or the project is short term in nature where we will not have to use the access again.

The following table lists some examples of access agreements that we can obtain from various agencies and landowners. Not all agencies and landowners will be willing to grant all of these agreements so you should contact them about the type of access they may be willing to give. Considerable work may be required to obtain some of these documents, especially if a Reciprocal Access Agreement is not in effect. Be sure to start to acquire these access agreements well in advance of when any construction is to occur.

## STATE FOREST ROAD MANUAL

### PERMITS FOR ROAD USE ISSUED BY OTHER AGENCIES/LANDOWNERS

TYPE	APPLICANT	ISSUING AGENT	PURPOSE
Short Term Easements	Area Forester through Bureau of Real Estate Management (B-REM)	County/U.S. Forest Service/Private Landowners	Short to medium term access to state lands.
Permanent Easements	Area Forester through BREM	County/U.S. Forest Service/Private Landowner	Provide a long term access agreement for permanent state forest roads.
Road Leases	Area Forester through BREM	County/U.S. Forest Service/Private Landowner	Provide mid to long term access to state lands.
Special Use Permits	Area Forester	U.S. Forest Service	Provide mid to long term access to state lands.
Access Permits	Area Forester	County/U.S. Forest Service	Provide short term access to state lands.
Authorization Letters	Area Forester	County	Provide access to state lands for a minor project.

RECIPROCAL ACCESS AGREEMENT  
BETWEEN  
STATE OF MINNESOTA  
DEPARTMENT OF NATURAL RESOURCES  
and  
\_\_\_\_\_ COUNTY

I. AUTHORITY

This AGREEMENT is made and entered into by and between \_\_\_\_\_ County hereinafter referred to as the COUNTY, and the State of Minnesota, Department of Natural Resources, hereinafter referred to as the DNR, under the provisions of Minnesota Statutes, Sections 84.025, Subd. 7, 84.63, 89.17, 92.50, 282.017, and 373.01.

II. PURPOSE

The purpose of this AGREEMENT is to provide a framework for cooperating and providing reciprocal access over certain Department of Natural Resources managed lands and certain County managed tax forfeited and other lands in order to more efficiently and economically serve the public interest.

The intent is to streamline the DNR and COUNTY permit process for commonly accepted, routine land management activities.

III. INTRODUCTION

The COUNTY and the DNR are responsible for the protection, administration, and management of intermingled County managed and DNR managed lands within the boundaries of various Area Management Units located within \_\_\_\_\_ County;

The COUNTY and DNR wish to obtain access over certain lands administered by each other for the purpose of natural resource management on a reciprocal basis;

The COUNTY and DNR desire to minimize administrative time and expenses for all transactions involving access to lands managed by the other party;

The COUNTY and DNR believe it is most cost effective and otherwise to the mutual benefit of both parties to cooperate with each other in matters relating to access over public land managed by the other party;

NOW THEREFORE, in consideration of the promises contained herein, the parties hereto agree to provide access to lands managed by the other party as follows:

#### IV. LAND ACCESS

1. **Permanent Easements Issued by the DNR** - The DNR will grant permanent easements at mutually agreed upon locations to the COUNTY across certain DNR administered lands under provisions of Minn. Stat. Sec. 84.63 for permanent resource management roads. Fees for such rights-of-ways will be based upon full fair market value including timber damages and administrative fees. The COUNTY agrees to assume road management control for such roads including, but not limited to, construction, maintenance and signing unless otherwise covered by a separate and specific road management agreement.

2. **Permanent Easements by the County** - The COUNTY will grant permanent easements at mutually agreed upon locations to the DNR across certain County managed lands under Minn. Stat. Secs. 282.017 or 373.01 based upon a fee that includes full fair market value, timber damages, and administration and publication fees. The DNR agrees to assume management control for such roads including, but not limited to construction, maintenance and signing unless otherwise covered by a separate and specific road management agreement.

3. **Leases by the DNR** - The DNR agrees to issue leases to the COUNTY for access across certain DNR administered lands where access needs exceed three years. Leases are issued for periods up to ten years under Minn. Stat. Secs. 89.17 and 92.50 and can be renewed upon request. Application shall be made ninety (90) days in advance to allow time for analysis and processing. Lease fees will be based upon full market value including timber damages and administrative fees.

4. **Leases by the County** - The COUNTY agrees to issue leases to the DNR for access across certain County administered lands where access needs exceed three years. Leases are issued for up to ten years under Minn. Stat. Sec. 282.04, subd. 1, and can be renewed upon request. Application shall be made ninety (90) days in advance to allow time for analysis and processing. Lease fees will include current land use fees, timber damages, and administration and publication fees.

5. **Access Permits by the DNR** - The DNR agrees to issue "Resource Management Access Permits" to the COUNTY for access across certain DNR administered lands in lieu of leases for short term or temporary access. Permits shall be valid for a maximum of three years and may be renewed for one additional three year maximum period if the resource management project has not been completed during the life of the original permit. No fee will be charged for such use because these permits are issued in reciprocity for access across COUNTY managed lands. The COUNTY agrees to apply for permits ninety (90) days in advance of the contract or timber sale advertising date to allow sufficient time for analysis and processing.

6. **Access Permits by the County** - The COUNTY agrees to issue "Access Permits" to the DNR for access across certain County administered lands in lieu of leases for short term or temporary access, not to exceed three years. No fee will be charged for such use because these permits will be issued in reciprocity for access across DNR managed lands. The DNR agrees to apply for such authorization

ninety (90) days in advance of the contract or timber sale advertising date to allow sufficient time for analysis and processing.

7. The COUNTY and DNR agree that success of this reciprocal access program is contingent upon a simple but adequate analysis of environmental effects and alternatives. Furthermore, both parties agree that the desired future state of cooperative project planning is to do access, transportation and timber sale planning approximately two years in advance of contract advertisement or offering the timber tract for sale.

8. All access easements, leases, resource management access permits, access permits and other authorization granted pursuant to this agreement shall be on a non-exclusive basis with grantor reserving the right to use the access for itself, its permittees and assigns. The grantor may use the roads without cost for all purposes deemed necessary or desirable in connection with the protection and administration of lands or resources of the grantor, provided that it will use the road for commercial hauling purposes, other than the removal of timber cut in construction or maintenance of the road or other occasional incidental use, only after arranging to pay or perform its pro rata share of road maintenance.

9. **Liability** - Each party agrees that it shall be responsible for its own acts and omissions and the results thereof to the extent authorized by law and shall not be responsible for the acts and omissions of the other party and the results thereof. DNR's liability shall be governed by the provisions of the Minnesota Tort Claims Act, Minn. Stat. Sec. 3.736, and other applicable law. The County's liability shall be governed by the provisions of the Municipal Tort Claims Act, Minn. Stat. Ch. 466, and other applicable law. Each party shall repair fully any damage to the other party's roads or trails caused by exercising privileges under any easement, lease or permit granted under this agreement.

10. **Construction Specifications** - All construction, reconstruction, maintenance or other work on road rights-of-way that is granted under this Agreement shall be in accordance with the plans, specifications and written stipulations approved by the access granting party prior to beginning work.

11. All roads resulting from access authorizations provided under this Agreement shall be management roads only and not public roads.

#### V. EFFECTIVE DATE

This Agreement shall be effective upon the latest date written below and shall remain in effect \_\_\_ years from that date. This agreement may be terminated by either party, following a thirty (30) day written notice of one party to the other.

## STATE FOREST ROAD MANUAL

### VI. ANNUAL MEETING

The DNR and COUNTY agree to meet annually to review provisions of this AGREEMENT. DNR Area Foresters and the COUNTY Area Land Manager will coordinate the review.

IN WITNESS WHEREOF, the parties hereto have executed this AGREEMENT intending to be bound thereby:

STATE OF MINNESOTA

DEPARTMENT OF NATURAL RESOURCES

STATE OF MINNESOTA

COUNTY OF \_\_\_\_\_

\_\_\_\_\_  
RODNEY W. SANDO                      Date  
Commissioner of Natural Resources

\_\_\_\_\_  
County Board Chairperson                      Date

Approved as to Form and Execution  
Hubert H. Humphrey III  
Attorney General

\_\_\_\_\_  
County Auditor/Clerk                      Date  
Attach Authorizing County Board  
Resolution

\_\_\_\_\_  
Special Asst. Attorney      Date  
General

\_\_\_\_\_  
Land Commissioner                      Date

\_\_\_\_\_  
Commissioner of Finance                      Date

\_\_\_\_\_  
Commissioner of Administration      Date



RESOURCE MANAGEMENT ACCESS PERMITS  
STATE LANDS UNDER THE AUTHORITY OF THE COMMISSIONER

RESOURCE MANAGEMENT ACCESS PERMITS

A. GENERAL POLICY AND PROCEDURES

1. **Permits with Reciprocal Access Agreements** - Commissioner's Delegation Order # \_\_\_\_\_ provides that DNR Area Supervisors and/or Area Managers from the Divisions of Forestry, Fish and Wildlife, and Trails and Waterways may issue resource management access permits to cross state lands for resource management purposes at no cost to governmental agencies and private landowners if there is a Reciprocal Access Agreement (RAA) in effect which provides access over their lands to the State. If trust lands are involved the DNR division granting access shall pay the trust for the value of the permit.

2. **Permits without a Reciprocal Access Agreement** - Area Supervisors and/or Area Managers may also issue permits to cross state lands to government agencies and private landowners that do not have a Reciprocal Access Agreement with the State. In these cases the Area Supervisor and/or Area Manager shall charge a one time fee for the term of the permit of \$20 per 40 acre parcel of state land crossed. Fees shall be collected at the time the permit is issued.

Access across state lands for state timber permit holders and contractors shall be provided for in the timber permit or contract.

3. Permits shall be valid for a maximum of 3 years and may be renewed for one additional 3 year maximum period if the resource management project has not been completed during the life of the original permit. If a permit is to be renewed new permit fees must be charged unless an RAA exists. If changes to the permit are necessary within the three year time limit, an amendment to the permit may be issued at no cost if the time frame for the permit is not changed. Permits are issued for resource management activities only and must be used only for the purposes identified in the permit. For the purposes of these permits resource management means, but is not limited to, timber harvesting, timber stand improvement, tree planting, wildlife habitat improvement, wetland restoration, extractive activities and development of recreational facilities. It does not include access to homes, cabins, businesses, or other non-resource management related activities. Access for these purposes must be obtained under the normal leasing or easement process.

4. The state reserves the right to use the access for state purposes. The permit is a non-exclusive right to use state land.

B. PROCEDURES FOR RESOURCE MANAGEMENT ACCESS PERMITS

## STATE FOREST ROAD MANUAL

1. Resource Management Access Permits may be issued on forest, wildlife, fisheries and state trail lands administered by the Department of Natural Resources with the approval of the Area Supervisor or Area Manager (hereafter referred to as the Area Supervisor) who administers the state lands. In cases where the permit is issued to cross two or more different administrative units, all Area Supervisors must sign the permit. This procedure is being adopted to supplement the current Department policy of leasing road rights of way and granting road easements. Existing lease and easement procedures shall remain in effect for all road rights of way that are needed for a period longer than 3 years or where the permit system is not applicable.
2. The purpose of the resource management access permit is to:
  - a) recognize that temporary accesses require a lesser and non-exclusive interest in state land as compared to a traditional lease or easement, that the state often benefits from construction of these accesses by being able to use them for resource management; and
  - b) provide an easy and simplified process for authorizing short term access to state lands.
3. The Area Supervisor shall not approve permits that are not on the prescribed form (NA-?????\_??). This form has been approved by the Attorney General's Office as required by the delegation order. No deviation from the form is authorized without approval of the Division Director and the Attorney General's Office. Use of state lands for resource management access by another agency or landowner is permitted only by permit, lease or easement.
4. The Area Supervisor must sign each permit and approve the access route descriptions listed on Exhibit A of the permit. If the access route involves new construction and requires the removal of timber, the timber shall be sold on a sold on appraised volume basis to the Permittee, to insure that the State recovers the value of timber to be removed. The timber damages shall be noted on the permit and paid at the time the permit is issued. Appraisal of timber shall be handled in accordance with procedures outlined in the Division of Forestry Timber Sales Manual.
5. The Area Supervisor must also approve the access road design before construction begins. Roads constructed under these permits should be built to class 5 or 6 forest road standards.

Guidelines listed in Water Quality in Forest Management - Best Management Practices in Minnesota must be followed for all access construction.

6. The Area Supervisor(s), pursuant to the Commissioner's Delegation Order, may suspend the permit if permit conditions have not been complied with or if fire or adverse weather conditions would prohibit safe use. The Area Supervisor(s) may also cancel the permit, when in the Area Supervisor's judgment, the permit conditions have not been complied with. No refunds of permit payment shall be made in the event of suspension or cancellation of the permit for cause.

7. All checks must be sent to the central office of the Division issuing the permit for processing of the fees. If more than one Division is involved, send it to one Division's central office with a note that two or more divisions are involved.

8. A copy of the permit must also be sent to the Regional Realty Specialist who will review the permit and forward it to the Bureau of Real Estate Management (BREM) in St. Paul. This will give BREM a record of uses of state land. The permit will also be used to bill the Division(s) for issuing the no cost permit to cross trust fund lands. Payments to the trust shall be paid annually by the Division issuing the no cost permit.

9. The Area Supervisor will inspect the access when the resource project is completed or when the permit has expired to insure that terms of the permit have been met.

C. PREPARING THE RESOURCE MANAGEMENT ACCESS PERMIT

1. The Resource Management Access Permit is prepared by the Area Supervisor or staff. The form should be typed or printed in ink. All information requested on the form should be filled in.

2. The permit should be numbered using the following numbering system:

144-18-\_\_\_\_ The first two numbers of the blanks are the Region /Area #. The next two numbers are the Area permit numbers and are numbered consecutively starting with 01 and ending with 99.

Example: 144-18-1101 would be the first resource management access permit issued for the Bemidji Area Forestry Office.

3. The legal descriptions to be crossed must be shown on Exhibit A of the permit form. Each parcel should have a description of the state land classification type which is being crossed based on the Bureau of Real Estate Management system. (e.g. School Trust, University Trust etc.). Do not use the old classification system that used AA, BA, LF and so on. If the permit involves lands managed by more than one DNR division, please list each Division's land separately.

4. Exhibit B is a map which shows the location of the access. This map can be a U.S.G.S. quadrangle, county highway map or other map provided by the permittee. State lands should be noted on the map.

5. The Permit should be signed by the Unit Manager and Permittee and forwarded to the Area Supervisor for approval and signature. Upon approving the Permit and collecting the fee, the Area Supervisor shall distribute copies to the Permittee, St. Paul Division Office with the payment and Real Estate Management in St. Paul.

## STATE FOREST ROAD MANUAL

6. If the permit is canceled or the work is completed before the expiration date the Area Supervisor(s) and/or Area Manager must notify the Bureau of Real Estate management so that BREM can update its land records.

# STATE FOREST ROAD MANUAL

NA-01931-01

MNDNR LOGO

70 County Permit Number

Administrator Region Area Permit Date

Permit Expiration Date

Resource Management Access Permit

Name of Permittee Address (No. & Street, RFD, Box No., City, State, Zip Code)

Telephone Number Reciprocal Access Agreement in  
effect  Yes  No

Gate Required  Yes  No

Access will be:  rehabilitated  left intact at expiration of the permit.

Access is permitted:  Summer only  Winter Only  Year Around

Purpose of the Permit:

Maximum Road Width \_\_\_\_\_

Legal descriptions of the Premises covered by this Permit are listed on Exhibit A (legal description page of form) and depicted on Exhibit B (map). Timber damages are also to be shown on Exhibit A.

Check One

In consideration of the sum of \$ \_\_\_\_\_ (timber damage and/or permit fee) payment of which is hereby acknowledged.

Pursuant to a Reciprocal Access Agreement between MNDNR and the above listed Permittee.

(Timber damages should be listed on the legal discretion sheet and paid by the Permittee)

You are authorized under the provisions of Minnesota Statutes 89.17 (Forestry) or 92.50 (other Divisions) and other applicable law to use or build a temporary access road across state lands described on Exhibit A to perform resource management activities. This permit is issued subject to all state and federal laws and the permit terms stated herein.

## STATE FOREST ROAD MANUAL

---

Signature of Permittee

Date

---

Signature of Unit Manager

Date

---

Signature of Area Supervisor and/or Area Manager

Date

---

Signature of Area Supervisor and/or Area Manager  
(If more than one discipline or Area Involved with the Permit.)

Date

**Form approved by the Attorney General's Office and issued pursuant to Commissioner's Delegation Order No. ???, \_\_\_\_\_, 1993. Form may not be changed without the prior approval of the Division Director and the Attorney General's Office.**

### **CONDITIONS AND TERMS FOR RESOURCE MANAGEMENT ACCESS PERMITS:**

1. Terms: This permit is not valid unless numbered, dated and signed by all parties. It expires on the expiration date shown, whenever the use of the resource management access is completed, upon mutual agreement, or upon violation of any of its terms and conditions, whichever comes first. It may be extended for one additional three year period, if the resource management project is not completed, by requesting an extension and paying additional fees. It is not transferable. It does not grant exclusive right to use the access to the exclusion of others. It does not relieve Permittee of any obligations imposed by law.

2. Permittee's Rights: This permit gives the Permittee the right to construct, reconstruct, maintain and/or use an access road crossing state land in accordance with road location and construction guidelines approved by the Area Supervisor. All construction and use shall conform to the Water Quality in Forest Management - Best Management Practices in Minnesota Handbook. Permittee agrees to obtain permits from applicable permitting authorities before doing any work in wetlands and public waters. The premises covered by the permit shall at all times be subject to sale, lease, and use for mineral or other purposes.

3. Suspension/Cancellation: The Area Supervisor acting for the Commissioner of Natural Resources may suspend or cancel all operations allowed by this permit when in his/her judgment the permit conditions have not been complied with. Any use of the resource management access during suspension or cancellation shall be deemed to be trespass. No refund of permit payment shall be made in the event of suspension or cancellation of the permit.

4. Maintenance: Permittee shall keep and leave the premises in a neat, clean and safe condition and shall dispose of all pollutants, contaminants, solid waste, hazardous waste and other materials in a lawful manner. The Permittee shall prevent pollution of the premises and adjacent state lands and natural resources. None of the materials listed above shall be stored, used or disposed of on the

premises except that gasoline, diesel, and other fuels may be stored for short periods in an approved container or tank while the Permittee is constructing or using the access road. Permittee shall comply with all federal, state or local laws concerning the storage, use and disposal of the materials listed above. Permittee shall be responsible for any damages to natural resources or adjacent state land caused by the Permittee.

5. Expiration/Abandonment: Permittee shall, on the expiration date or the last day of Permittee's use, if earlier, except as otherwise provided in this permit, remove all improvements from the premises or any other property placed thereon and shall restore the site to a condition satisfactory to the Area Supervisor. If the Permittee fails to remove any improvements and property after 30 days from the expiration date or last day of use, it shall be deemed abandoned and become the property of the State to dispose of in accordance with the provisions of law. The State may restore the area and all costs shall be paid by the Permittee.

6. Liability: **a) Permittees which are Government Agencies** - Permittee and the State agree that each party shall be responsible for its own acts and omissions and the results thereof to the extent authorized by law and shall not be responsible for acts and omissions of the other party and the results thereof. The State's liability shall be governed by the provisions of the Minnesota Tort Claims Act, M.S. Sec. 3.736, and other applicable law; Local Unit of Government's liability shall be governed by the Municipal Tort Claims Act, M.S. Ch. 466, and other applicable law. The federal government's liability shall be governed by the Federal Tort Claims Act 28 USCS Sec. 1346 (b) and other applicable law.

**b) Permittees which are not Government Agencies** - This permit shall not be construed as imposing any liability on the state for injury or damage to the person or property of the Permittee or to any other persons arising out of any use of this access, or under any other easement, right of way, license, lease or other encumbrances now in effect. The permittee shall indemnify and hold harmless the state from all claims arising out of the use of the access whether such claims are asserted by civil action or otherwise.

7. Public Recreational Use: The Permittee agrees and understands that this Permit does not grant an exclusive right to the Premises and that the public lands authorized for use under the permit shall be open to public recreational uses, as defined in M.S. Sec. 87.021, not inconsistent with the purposes of this permit.

8. Grantor's Use: The State may use the roads without cost for all purposes deemed necessary or desirable in connection with the protection and administration of the lands or resources of the State, provided that it will use the road for commercial hauling purposes, other than the removal of timber in construction or maintenance of the road or other occasional incidental use, only after arranging to pay or perform its pro rata share of road maintenance.

9. Repair: Permittee shall repair fully any damage to the State's roads, trails or other property caused by exercising privileges under this permit.

## STATE FOREST ROAD MANUAL

10. Construction Specifications: All road locations and construction, reconstruction, maintenance, signing or other work on any road right-of-way that is granted under this permit shall be in accordance with the plans, specifications and written stipulations approved by the DNR prior to beginning work.

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Attachments:

Exhibit A - Legal Descriptions

Exhibit B - Map



# STATE FOREST ROAD MANUAL

## EXHIBIT A - LEGAL DESCRIPTIONS

List legal descriptions of state land crossed by the Resource Management Access on this page. Fill in all information listed. If the permit crosses more than one Division's land list each Division's lands consecutively. Total timber damages and fees for each Division separately at the bottom of the form, then add together to calculate total permit fee. List total permit fee in the space provided on the front page of the permit form.

### Legal Descriptions

Legal Description SEC. ___ TWP. ___ RA ___	Forty	Govt. Lot	Land Class	Timber Damages	Administrator

(If more legal descriptions are needed attach a separate sheet.)

_____	\$ _____	+	\$ _____	= A. \$ _____
(Admin.)	Permit Fee		Timber Damages	
_____	\$ _____	+	\$ _____	= B. \$ _____
(Admin.)	Permit Fee		Timber Damages	
_____	\$ _____	+	\$ _____	= C. \$ _____
(Admin.)	Permit Fee		Timber Damages	

Total Fee \$ \_\_\_\_\_

Permit fee = # Forties for each Admin. from above X \$20 per forty  
 Timber Damages = Sum of Timber Damage for each Admin. from above  
 Total Fee = Sum of A + B + C .







**C. COOPERATIVE AGREEMENTS.**

## COOPERATIVE AGREEMENTS

Cooperative agreements between DNR and other road managers and land users/owners should always be considered in planning construction and maintenance programs. Agencies who provide and maintain access to forested and related lands are:

### A. TOWNSHIPS

Local governments at the township level are generally the easiest to work with. Many township roads serving local residents in a forest area are classified similar to the state forest roads, so maintenance and construction agreements are very compatible. Many of our forest roads serve similar needs as township roads and thus the question often arises; who should be maintaining a particular road? When a road serves resources vital to the Department and Division, we should examine opportunities for cost sharing versus taking control of a road. If roads access private lands with homesteads or year around dwellings, the township should be responsible for maintenance. Use form NA-2077-1 in any cooperative work agreements with Townships (see page C - 12 and C - 13).

### B. COUNTIES

Opportunities exist to develop cooperative agreements with counties on roads and other land management activities of the Division. Depending on the size of the county land base, we may be able to jointly manage a forest road system with the County Land Department because the two agencies provide similar services. Cost sharing opportunities will arise as the demand for forest resources increases. Where counties do not have a large land base and state forest roads serve local residents, agreements should be made with the County Highway Department.

### C. FEDERAL GOVERNMENT AGENCIES. (USFS & BIA)

In some areas of the state, state forest roads cross federal ownerships and are intermixed with their roads. Agreements are in force with the USFS where the DNR has agreed to pay for use of their roads when our timber is hauled on them. Historically it is very difficult to develop cooperative agreements with the USFS for construction or maintenance contracts. The bureaucracy, and differences in administrative procedures prevent an easy means of forming workable agreements.

### D. INDUSTRIAL. (Paper Companies)

Some paper companies in northern Minnesota have a land base that provides wood fiber for their manufacturing processes. Often these lands are mingled with DNR lands and provide the same type access to all forest users.

Many formal and informal agreements have been developed with industry to provide access and maintenance on roads serving harvesting and reforestation projects. Management styles vary between companies and how they relate to a public agency like ours, so the process of developing these agreements varies greatly. All agreements must be signed by the DNR Commissioner or his delegate and the responsible company representative.

**E. INTRA-DEPARTMENT. (Wildlife, Trails and Waterways, Parks)**

Sharing funds with other disciplines on a road contract or program is easily done when we have similar objectives for lands served by the road system. These types of projects are developed at the Area level between discipline managers. Funding exchanges are resolved and processed at the Region level.

**COOPERATIVE AGREEMENTS - REASONS FOR DEVELOPMENT.**

Some reasons for exploring the use of cooperative agreements are:

**Construction.**

1. The pooling of funds to carry out a specific project when funds of one agency are limited.
2. Insure that all agencies pay their "fair share" on a specific road when manageable forest lands are served by that road.
3. When a road cannot be completed in one phase, it might take a series of contracts to complete the system.
4. The exchange of technical expertise and equipment which one agency lacks.

**Maintenance.**

1. To provide an opportunity to better manage equipment and labor.
2. Allow the primary user the opportunity to pay their share of maintenance commensurate with their use of the road (when the primary user is not the road owner).
3. The exchange and use of equipment and technical expertise which one agency lacks.

Any cooperative agreement should explore the sharing of resources to manage a road. Items to consider are: funding, equipment, labor, materials (pipes & other construction items), granular surfacing and borrow, contracting and administrative services.

### **Cooperative Agreements. Strategy, Design & Scope.**

A cost sharing agreement might range from a one time exchange of a few dollars to a long term agreement covering many years or decades. It is obvious that an informal-handshake type of agreement can and should be conducted at the local level when there is a minor exchange of time and equipment. For instance: a culvert that is not readily available when needed, a grading job when regular equipment is broken down, and similar types of tradeoffs to make the local road program run smoothly. On the other extreme are agreements that involve two or more agencies and consist of substantial funds and related support items.

These types of agreements should be designed by experienced field and St. Paul staff, and guided and reviewed by legal representatives of the agencies involved. The agencies may have different procedures governing what can and cannot be done.

All agreements should be concise and easy to understand. They should be supported by a map and other pertinent information which can be used during the life of the agreement.

The following pages contain sample forms which can be referenced and used in the design of future agreements. If another agency is drawing up the agreement, you may wish to provide them a copy of this outline as it has been approved by our Attorney Generals Office.

Naturally, any agreement must be signed to make it legal and binding. Who has authority to sign an agreement may vary with the agencies involved. State law requires that the Commissioner sign all agreements unless authority to sign an agreement has been delegated to a lower level.



Date:

COOPERATIVE AGREEMENT - MAINTENANCE

THIS AGREEMENT is made between the State of Minnesota acting by and through its Commissioner of Natural Resources, hereinafter referred to as the "State," and Hubbard County, Minnesota, acting through its Board of Commissioners, hereinafter referred to as the "County."

WHEREAS, the State has authority pursuant to Minn. State Sec. 89.002, subd. 3 (1992) to construct, maintain and improve state forest roads under the commissioner's authority which is adequate to permit the commissioner to manage, protect and develop those lands and their forest resources;

WHEREAS, pursuant to Minn. Stat. sec 84.026 (1992) the Commissioner of Natural Resources is authorized to enter into contractual agreements with any public or private entity for the provision of statutorily prescribed natural resource services by the department;

WHEREAS, the purpose of the Agreement is to maintain and improve certain State Forest Roads, as listed in the attachment, to improve access to County and State land for timber management purposes;

WHEREAS, the maintenance of these roads will be of benefit to Hubbard County and the lands administered by Hubbard County;

WHEREAS, on \_\_\_\_\_ 19\_\_ the Board of Commissioners of Hubbard County approved the payment to the State Department of Natural Resources for their percentage share of maintenance costs of said roads ( as stated in the attached copy of the duly signed resolution);

NOW THEREFORE, it is agreed by and between the State and County as follows:

I. STATE RESPONSIBILITIES. The State will hire an equipment operator, provide a grader and fuel, maintain the equipment, and provide direction and supervision for blading State Forest Roads or contract for equivalent services. The State will maintain records of expenses incurred for services in this agreement and submit a bill to the county at the end of each State Fiscal Year and at the end of each season of grading in the Fall. The bill will include: labor (hourly wage +13% for benefits), fuel, fleet management rate for equipment, and other agreed upon expenses for roads in this agreement.

II. COUNTY RESPONSIBILITIES. The County shall contribute toward the cost of maintaining State Forest Roads in this agreement at the following percentage rates:

Spider/Coon	-	75%
Halvorson	-	50%

## STATE FOREST ROAD MANUAL

Wintersteen -	50%
Hennepin Lake -	75%
Schoolcraft -	50% (also known as Frontenac)
Stumphages Rpsds -	75%

### III. OTHER PROVISIONS.

- A. The State shall maintain accurate records which document the use of state and county funds within this agreement.
- B. Nothing in this Agreement shall be construed as granting any ownership of the road to the County.
- C. All grading to be on an as needed basis and agreed upon by verbal notice of both parties, which will be followed up by written documentation signed by the Area Forester and the County Land Commissioner,
- D. Other maintenance work such as spot graveling, ditching, brushing, extra grading, and emergency repairs can be done at the same percentage rates for sharing costs after written agreement of both parties (Area Forester and County Land Commissioner).
- E. No agreement either verbal or written to commit State funds shall be entered into without prior approval from the Regional Business Manager.
- F. Roads may be added or subtracted from this agreement by written amendment signed by both parties.
- G. This agreement shall remain in effect for two years from date of signing or until one party gives 30 days written notice to the other of intention to cancel.
- H. County contributions within this agreement shall be retroactive to \_\_\_\_\_19\_\_.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement.

HUBBARD COUNTY, MINNESOTA

STATE OF MINNESOTA  
D E P A R T M E N T   O F   N A T U R A L  
R E S O U R C E S

By: \_\_\_\_\_ By: \_\_\_\_\_

Chairman, Board of Commissioners

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

County Auditor \_\_\_\_\_ Approved as to form and execution

Hubert H. Humphrey, III Attorney  
General

Date: \_\_\_\_\_

By: \_\_\_\_\_

Special Assistant Attorney General

Date: \_\_\_\_\_

Commissioner of Administration:

By: \_\_\_\_\_

Date: \_\_\_\_\_

Commissioner of Finance:

Encumbered

By: \_\_\_\_\_

Date: \_\_\_\_\_

## STATE FOREST ROAD MANUAL

### ROADS UNDER COOPERATIVE MAINTENANCE AGREEMENT WITH HUBBARD COUNTY

NAME	BEGINNING	ENDING	T O T A L		R O A D M I L E S
	LOCATION	LOCATION	M	I	
SPIDER/COON	22-143-35	15-142-35	8.2		
HALVORSON LAKE	30-143-30	34-143-34	6.2		
WINTERSTEEN	22-144-34	15-144-34	2.0		
HENNEPIN LAKE	29-145-29	8-144-34	3.6		
SCHOOLCRAFT	21-145-34	22-145-34	1.1		
STUMPHAGES					
RAPIDS	6-145-35	21-145-35	6.4		

#### ESTIMATED 1989 GRADING COSTS (23.00/MI GRADED 4 TIMES)

<u>ROAD NAME</u>	<u>COUNTY SHARE</u>	<u>STATE SHARE</u>	<u>T O T A L</u>
Spider/Coon	\$566	\$189	\$755
Halvorson Lake	\$285	\$285	\$570
Wintersteen	\$92.50	\$92.50	\$185
Hennepin Lake	\$247	\$83	\$330
Schoolcraft	\$50	\$50	\$100
Stumphages			
<u>Rapids</u>	<u>\$525</u>	<u>\$175</u>	<u>\$700</u>
	\$1,765.50	\$875.50	\$2,640

COOPERATIVE AGREEMENT - CONSTRUCTION  
(ANOTHER AGENCY CONDUCTS THE CONTRACTING)

THIS AGREEMENT is made between the State of Minnesota acting by and through its Commissioner of Natural Resources, hereinafter referred to as the "State," and Roseau County, Minnesota, acting through its Board of Commissioners, hereinafter referred to as the "County."

WHEREAS, the state has authority pursuant to Minnesota Statutes 89.002, Subd. 3 to construct, maintain and improve state forest roads and bridges which provide access to state forest land and other forest land under the authority of the commissioner which is adequate to permit the commissioner to manage, protect and develop those lands and their forest resources;

WHEREAS, the County has the authority to construct and maintain County roads pursuant to Minnesota Statutes Sec. 163.02 and related laws;

WHEREAS, the purpose of the Agreement is to reconstruct and improve the flat-car bridge across the Sprague (Mud) Creek in the NE NE, Sec. 4, and NW NW, Sec. 3 of Unorganized Township 163 N, Range 39 W, in Roseau County, Minnesota, to improve access to State land for timber purposes;

WHEREAS, the reconstruction of said bridge will be of benefit to Roseau County and the lands administered by the Minnesota D.N.R., Forestry;

WHEREAS, on December 3, 1987, the Minnesota Department of Natural Resources, Division of Forestry approved the payment to the Roseau County Highway Department, the amount of one-half (1/2) the estimate of \$8679.84 for bridge repair in Sections 3 & 4 of T 163 N, R 39 W;

NOW THEREFORE, it is agreed by and between the State and the County as follows:

I. STATE RESPONSIBILITIES.

The County has prepared and the State has approved plans and specifications for the bridge reconstruction which are identified by County Engineer's estimate and which are incorporated into this, Agreement by reference.

The state will make payment of one-half (1/2) the total cost not to exceed \$4,339.92 to the County upon completion of work on said bridge.

II. COUNTY RESPONSIBILITIES.

The County shall reconstruct bridge at an estimated cost of \$8,679.84 of which the County will pay one-half (1/2) of total cost.

# STATE FOREST ROAD MANUAL

### III. OTHER PROVISIONS.

The books, records, documents and accounting procedures and practices of the County relative to this contract shall be subject to examination by the State and by the Legislative Auditor.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement.

ROSEAU COUNTY, MINNESOTA

By : \_\_\_\_\_  
Chairman, Board of Commissioners

Date: \_\_\_\_\_

By : \_\_\_\_\_

County Auditor

Date: \_\_\_\_\_

STATE OF MINNESOTA  
DEPARTMENT OF NATURAL  
RESOURCES

By: \_\_\_\_\_  
Commissioner of Natural  
Resources

Date: \_\_\_\_\_

APPROVED AS TO FORM AND  
EXECUTION  
SPECIAL ASSISTANT ATTORNEY  
GENERAL:

By: \_\_\_\_\_

Date: \_\_\_\_\_

COMMISSIONER OF ADMINISTRATION:

By: \_\_\_\_\_

Date: \_\_\_\_\_

COMMISSIONER OF FINANCE  
ENCUMBERED  
DEPARTMENT OF FINANCE:

By: \_\_\_\_\_

Date: \_\_\_\_\_

INSTRUCTIONS FOR USE  
OF BOARD RESOLUTION AUTHORIZING ROAD WORK

1. Form (NA-2077) which is attached is used for working on township and county road right of ways to provide access to state land. It is NOT to be used for taking over road maintenance responsibilities which local government units do not wish to continue.
2. The road authority's and county recorder's records must be checked BEFORE starting work to verify right of way ownership and width. This will help decide the road authority's rights to use the land for a roadway.
3. Reconstruction or maintenance of these roads must meet the applicable standards of the road authority (usually DNR-Class 2), check for a management agreement. The full road width must be treated this way. For Minimum Maintenance roads, there may not be any official standards to follow, but the plans and specifications must be approved in writing by the road authority.
4. The full and proper description of the road to be worked on is required. If the description will not fit in the space designated, then continue it on a separate sheet and reference it in the proper section of the form. For example: " Legal description is continued in exhibit A which is attached and incorporated herein."

# STATE FOREST ROAD MANUAL

Form NA 2077

(Rev. 3/91)

BOARD RESOLUTION AUTHORIZING ROAD WORK

RESOLUTION OF THE COUNTY OR TOWN BOARD OF

\_\_\_\_\_ (Town) \_\_\_\_\_ (County)

Adopted \_\_\_\_\_ 19\_\_\_\_

Moved by commissioner or board member: \_\_\_\_\_:

WHEREAS, \_\_\_\_\_ county or township is the legal road authority for the \_\_\_\_\_ road located in the Township of \_\_\_\_\_, County of \_\_\_\_\_, State of Minnesota, and described as follows, to wit:

WHEREAS, the condition of the above described road is such that it requires repair or reconstruction to make it suitable for use; and that said \_\_\_\_\_ County/Township is without adequate funds to repair or reconstruct the above described road; and

WHEREAS, the State of Minnesota, by its Department of Natural Resources, Division of Forestry, has requested permission to repair or reconstruct the above described road to provide adequate access to state forest roads and state lands;

NOW, THEREFORE, BE IT RESOLVED, That permission and license is hereby granted to the Department of Natural Resources to repair or reconstruct or to perform maintenance on the above described road as it determines is beneficial to its use of the road for a period of \_\_\_\_\_ years from the date of this resolution.

IT IS FURTHER RESOLVED, That \_\_\_\_\_ is appointed to review and \_\_\_\_\_ (Title) approve all specifications and plans for road repair or reconstruction authorized under this resolution.

IT IS FURTHER RESOLVED, That \_\_\_\_\_ County/Township, as the legal road authority, shall continue to be responsible for the maintenance of the above described road as required by law.

Board Member: \_\_\_\_\_ moved the adoption of the resolution and it was declared adopted upon the following vote:

Yeas: \_\_\_\_\_

Nays: \_\_\_\_\_

STATE OF MINNESOTA )

) SS

COUNTY OF )

I, \_\_\_\_\_ Clerk of the County Board of/Town Clerk of the Township of \_\_\_\_\_, County of \_\_\_\_\_, do hereby certify that I have compared the foregoing with the original resolution filed in my office on the \_\_\_\_\_ day of \_\_\_\_\_, A.D. 19 \_\_\_\_\_; and that the same is a true and correct copy of the whole thereof.

WITNESS MY HAND AND SEAL OF OFFICE at \_\_\_\_\_, Minnesota this \_\_\_\_\_ day of \_\_\_\_\_, A.D. 19 \_\_\_\_\_.

\_\_\_\_\_  
Town Clerk or Clerk of the County Board







**D. CLOSURE AND ABANDONMENT**

## STATE FOREST ROAD MANUAL

### DNR-FORESTRY ROAD GATING, CLOSURE and SEASONAL CLOSURE GUIDELINES

Gating or other forms of road closure are management tools that may be used for a variety of reasons. The objective of closing a road or trail is to limit human impact on the resources. Some resources protected by closure are: The road, various species of wildlife, the forest, unique plant species or ecosystems, and non motorized recreation opportunities.

These guidelines will assist field staff in the location and use of gates. Gates may be used to limit all vehicles including ATV's or to restrict only regular highway vehicles, according to the needs of the resources. Signs attached to the gate should clearly state acceptable uses. The expense of gates or maintenance of other control structures has been considered in the development of these guidelines. Circumstances may arise where additional gates are more economical or effective than other control structures.

The guidelines are divided into three general categories.

- A. Gates may not be appropriate on existing or newly constructed roads when:
1. The road is a through road or has developed a history of thorough traffic.
  2. The right-of-way is a township or other public road. These are governed by public road law and cannot be closed by the Division of Forestry.
  3. There is a permanent residence on its travel-way. If gated, there must be an agreement, (a lease or easement), with the resident to provide necessary resource protection and access.
  4. The road leads to other forest roads under the jurisdiction of other agencies or corporations, unless it is covered by a cooperative road agreement. To provide protection of these roads and resources, on a temporary basis, removable barricades and signs are suggested for road closure.
- B. Gates may be installed on existing roads and should be installed on newly constructed roads when they:

1. Are constructed for the sole purpose of timber management and reforestation.
  2. Access cover-types with a high susceptibility to wildfire damage.
  3. Are constructed to aid in the management and protection of wildlife and fish.
  4. Are constructed into timber land that would otherwise exceed Department guidelines for protecting the gray wolf (or other critical) habitat.
  5. Would conflict with other recreational use of the area during a specific season (e.g. ski trails, snowmobile trails, walking trails, etc.).
  6. Provide access to gravel and borrow pits.
  7. Access state recreation sites, to prevent off-season vandalism.
  8. Roads access seasonal private property. These roads should have lease or easement agreements acknowledging the Department's right to manage the road in their best interest, which may limit access to these parcels.
  9. Receive major upgrading.
  10. Gating is recommended in a cooperative agreement with other parties or agencies.
- C. To prevent vehicular traffic use on forest roads, gates may be closed when:
1. Road surfaces are susceptible to damage from improper, excessive, or regular use.
  2. The surrounding forested vicinity is susceptible to wildfire damage.
  3. Forest products or equipment is subject to theft or damage.
  4. Recreational facilities need protection from vandalism during the off-season.
  5. All other land and forest related resources need protection from excessive and illegal

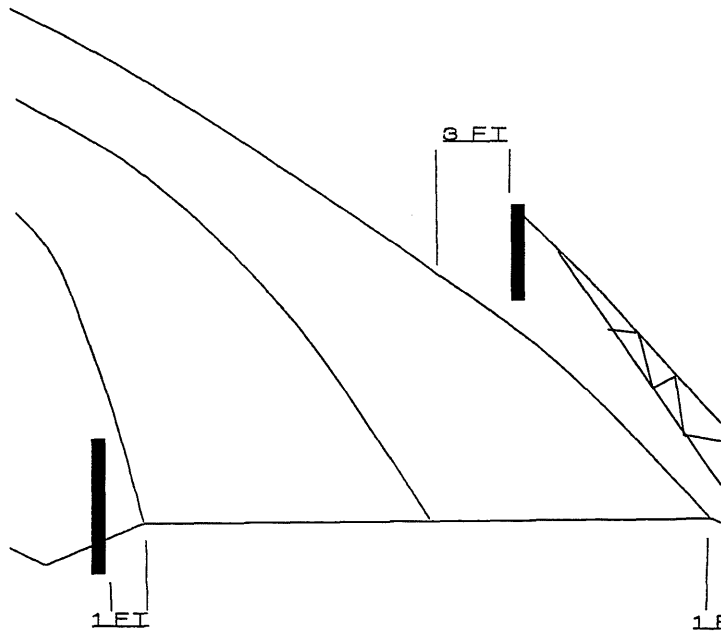
use or harvest.

6. Lands are seasonally managed for specific recreational use (e.g. ATV, horse, snowmobile, walking trails).

## GATE INSTALLATION

Gate installation shall provide safe passage and visibility when opened; and safe stopping notices in adverse conditions when closed. The following guidelines shall be observed when installing new gates or replacing old ones.

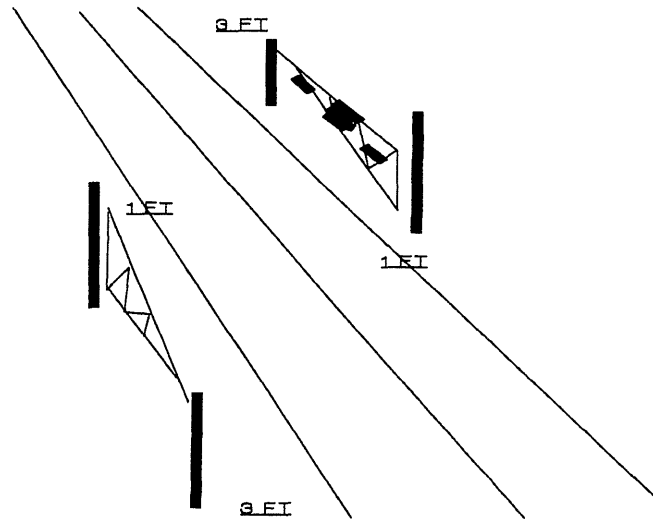
1. The hinge post for a single panel gate shall be on the right-hand side of the road when approached from the "public" side of the gate.
2. The gate shall open toward state land (away from the oncoming traffic).
3. In the open position, there shall be one foot minimum clearance between the gate and the shoulder of the road. This normally means the gate post is 18 or more inches from the road shoulder. See Figure 1.



GATE POST POSITIONS  
FIGURE 1

4. In the open position the gate shall be set on a rest post and locked open.
5. The rest post shall be set so there is at least three feet of clearance between the road shoulder and the open gate.
6. The latch post shall be set with a minimum clearance of one foot from the road shoulder.
7. The gate shall rest on, and be supported by, the latch post when closed.
8. When two panel gates are installed, the left-hand side shall open toward the "public" side. The resting posts shall be set to the same offset dimensions (three ft.) on both sides of the road, but in opposite directions. See figure 2.

## STATE FOREST ROAD MANUAL



DOUBLE GATE TYPICAL INSTALLATION  
FIGURE 2

9. Gate posts and rest posts shall have "type 2" object markers (6" X 12" vertical yellow reflective) attached on both sides. See signs section for more information.
10. The gate shall have an explanatory sign and two barricade panels (12" X 24" horizontal signs with reflective red and white 3" - 45 degree stripes) on each gate panel. Barricade panels are mounted at least four feet above ground. There should be a pair of barricade panels on both sides of the gate.
11. The explanatory sign is mounted on the right panel so it is readable when vehicles pass through the gate.

**GATE LOCATION** - Location is critical to gate effectiveness and maintenance reduction. Adequate space should be provided for vehicles to park off the road whenever possible. The parking area needs sufficient turnaround room and parking space so the road is not obstructed. At least 15 feet of additional width is recommended. A physical obstruction or natural terrain feature like wet lands



or drainage-ways will improve closure effectiveness. Locations near main traveled routes are less susceptible to vandalism.

**LOCKS** - The standard lock is the Yale tower lock. This will provide access in emergencies for most Division employees without having to issue additional keys. Where multiple users need access, a lock chain is recommended. In this situation each lock should be fastened into the ones on either side of it (only the end locks attach to the chain). This way, opening any lock in the chain will release the gate. One key for each lock must be given to the Area Forester.

**TYPICAL GATE DRAWINGS** - Several gate configurations are now used by the Division of Forestry. The diagrams on the following pages are suggested types. Heavy Duty stockyard gates with tubular frames are inexpensive and readily available. This type of gate is useful in locations where vandalism is not a problem. See diagrams at the end of this section.

**PUBLIC NOTIFICATION - NEW ROADS** - When installing a gate on a new road the public should be notified when the project is announced. The gate should be mentioned in the Area transportation plan and at county/Area road committee meetings. Once installed, the gate should be signed appropriately to inform the public of the reasons for closure and acceptable uses.

If the contract award or other project information is carried in the local papers, the gate should be mentioned.

**EXISTING ROADS** - When gating existing roads, notification must go beyond the transportation plan and the county/Area road committee, to include broader public involvement. It is recommended that intent to gate a road be published in the local paper. Notification should also go to sportsmen's groups in the affected area. Where gating may be particularly controversial, a public information meeting or open house is recommended to explain our position and gather input from potential users and supporters. Gates with appropriate information signs explaining its purpose and use, should be installed at least four months before road closure.

**SEASONAL ROAD RESTRICTION AND CLOSURE** - Areas should request authorization from the Regional Forest Supervisor to close plowed roads, or roads otherwise available for vehicular travel, by the end of February. The actual closure date for each road will be dependent on local conditions. Notification of seasonal closure should be mailed to affected loggers and mills at least one week before the anticipated closing date. Publication of a specific road closure should be

made in the local papers. Notice of the lifting of restrictions should also be published locally. "ROAD CLOSED" signs (black on white) should be erected on temporary barricades or posts at all common entry points along the road.

**IMPORTANCE** - Seasonal road closure can be handled on a road by road basis. State Forest roads will usually be closed to hauling when the county or MNDOT has spring load restrictions in effect. Our roads often close before public roads because of our lower construction standards. Some roads should remain closed for longer periods if shading or inadequate drainage is a problem. It is important to observe road and weather conditions and stay in touch with loggers and industry regarding protection of the investment.

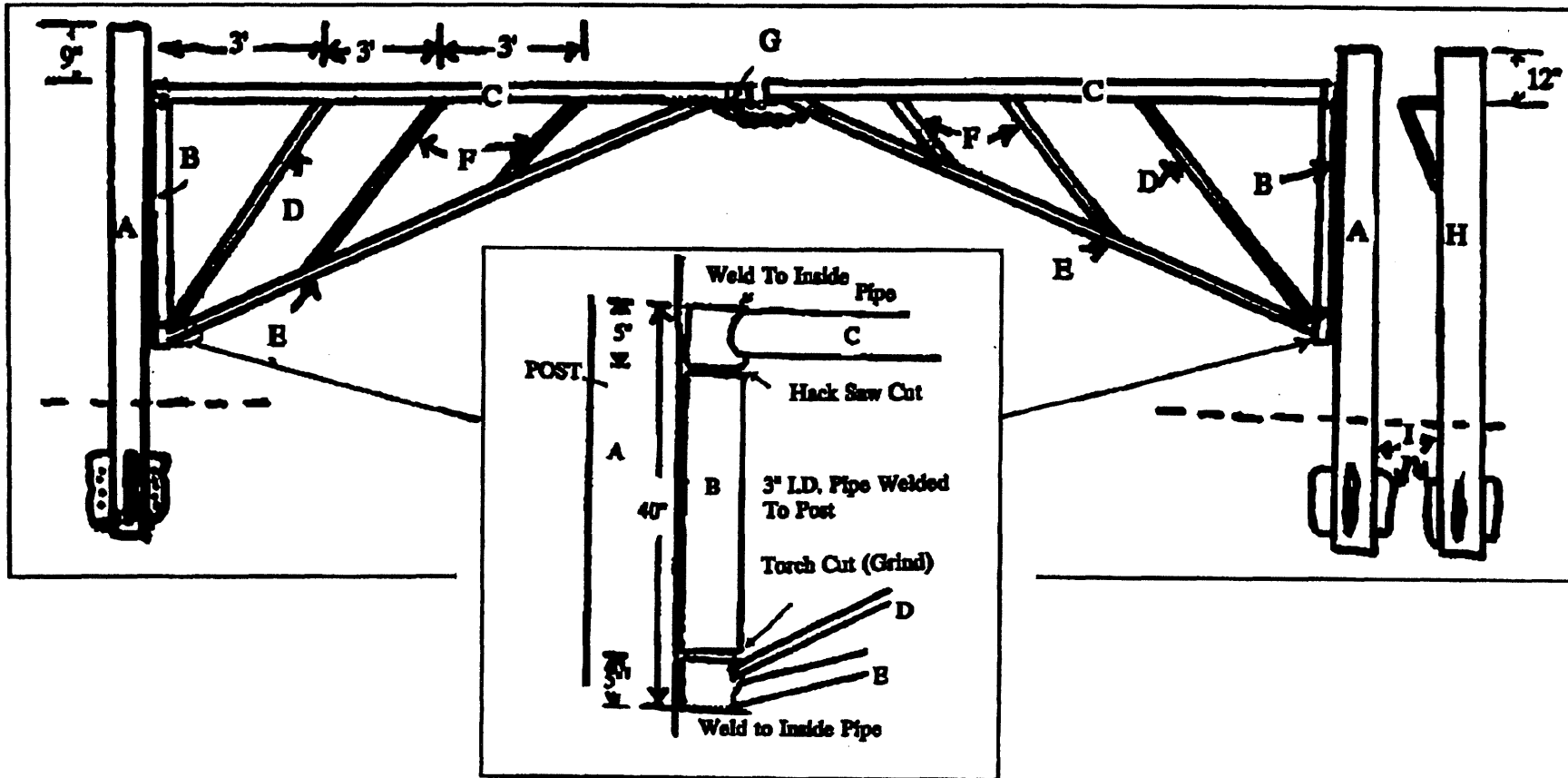
**DAMAGE** - Ruts or other damages to the road surface, over 1.5 inches, are extremely costly to repair (\$4500 to \$9000 per mile). If damage extends deeper than the surface, costs may run considerably higher. Restrictions should include pickup trucks because of damage potential from heavy wheel loads.

**RESTRICTED USE** - It may be necessary to restrict traffic and hauling to periods when the road is frozen. Only allow hauling from 2:00 a.m. to 8:00 a.m. on nights when temperatures drop below freezing.

The rule of thumb:

- 
- The top six inches of surface must be frozen before hauling.
  - The top three inches of surface must be frozen for light vehicle use (less than 6,000 LB.)

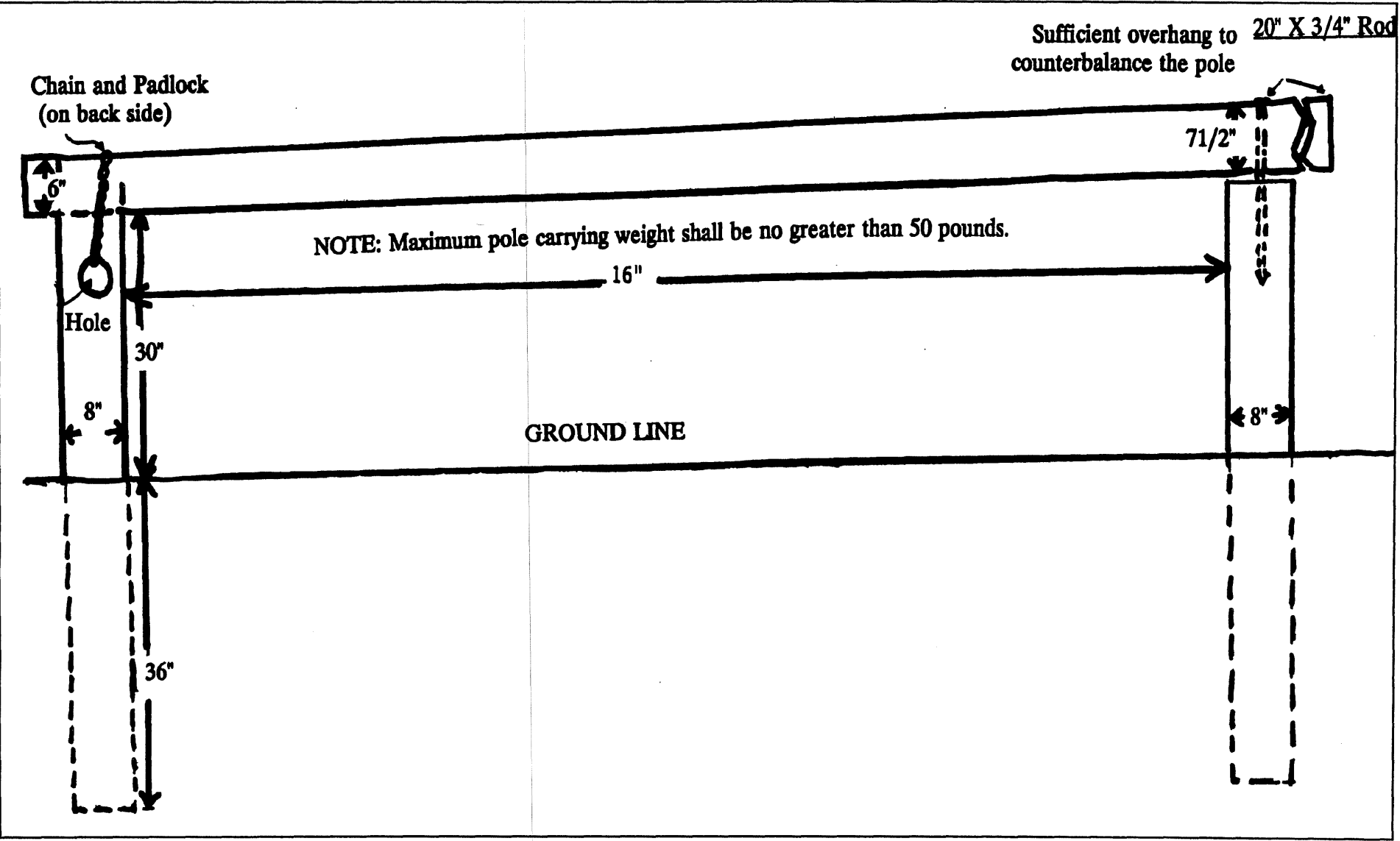
**DIVISION OF FORESTRY  
GATE CONSTRUCTION DETAILS**



Lengths are Approximate

- A. 5" I.D. PIPE - 8 FEET LONG
- B. 3" PIPE - 40" LONG, CUT 5" FROM EACH END.  
INSERT SMALLER DIAMETER PIPE INSIDE 40" PIPE.  
WELD ENDS TOGETHER. (SEE DIAGRAM
- C. 3" PIPE - MAKE LENGTH 12 FEET.
- D. 1.5" PIPE - 4 FEET LONG, 3 FEET FROM HINGE.
- E. 1.5" PIPE - ALLOW ROOM FOR REST ON POST

- F. 1.5" PIPE - 3 FEET APART
- G. 4 FOOT CHAIN HARDENED, WELD TO GATE
- H. 3" PIPE - 8 FEET LONG, MAKE REST 12" FROM TOP.  
ONE FOR EACH GATE. NORTH GATE WILL HAVE REST  
POST EAST OF GATE; SOUTH GATE WILL HAVE REST  
POST WEST OF GATE.
- I. BURY POST 3 FEET IN GROUND (WITH 3 - 2' x 6"  
ANCHOR FINS WELDED TO POST) IN 1.5 TO 2 CUBIC  
YARDS OF CEMENT.



Chain and Padlock  
(on back side)

Sufficient overhang to counterbalance the pole  
20" X 3/4" Rod

7 1/2"

NOTE: Maximum pole carrying weight shall be no greater than 50 pounds.

16"

Hole

30"

8"

GROUND LINE

8"

36"

D-10

STATE OF MINNESOTA  
DEPARTMENT OF NATURAL RESOURCES

COMMISSIONER'S DELEGATION ORDER No. 187  
ROAD CLOSURE

By virtue of authority vested in me by Minnesota Statutes, 1971, 84.083, I, Robert L. Herbst, Commissioner of Natural Resources, do hereby delegate to the persons now or hereafter holding the office of Regional Forest Supervisor in the respective Forest Regions established by the Division of Forestry, Department of Natural Resources, authority to exercise the power to close roads or trails for the purpose of protecting from damage or destruction such roads and adjacent forest lands pursuant to Minnesota Statutes 1971 84.027, Subdivision 2, provided that prior to any such closing, said Regional Forest Supervisor shall execute a Forest Road Closure Order on a form prescribed and shall duly post said road or roads.

In the absence of a Regional Forest Supervisor in the region affected, the power granted hereunder may be exercised by Regional Staff Supervisor of such region.

Pursuant to the authority vested in me by Minnesota Statutes 1969, 84.083, I hereby direct that the originals of orders issued pursuant hereto shall be filed and kept in the Regional Forestry Offices.

Dated at Saint Paul, Minnesota, this 29 day of January, 1973.

ROBERT L. HERBST  
COMMISSIONER OF NATURAL RESOURCES

STATE FOREST ROAD MANUAL

STATE OF MINNESOTA  
DEPARTMENT OF NATURAL RESOURCES

Road Closure Order

By virtue of authority vested in me as a Forestry Regional Manager by the Commissioner of Natural Resources in Delegation Order No. 187, I do hereby find that conditions exist which may render the following forest roads and trails impassable to:

Based upon the foregoing, I hereby order the \_\_\_\_\_  
\_\_\_\_\_ closed to vehicular travel as indicated, and that said road shall be posted to advise users thereof of such restriction.

Dated the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_.

\_\_\_\_\_  
FORESTRY REGIONAL MANAGER  
DIVISION OF FORESTRY  
D E P A R T M E N T   O F   N A T U R A L  
R E S O U R C E S

ACKNOWLEDGMENT

STATE OF MINNESOTA )  
  ) ss.  
COUNTY OF \_\_\_\_\_)

On this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_, before me personally appeared \_\_\_\_\_, Forestry Regional Manager of the Division of Forestry, Department of Natural Resources, to me known to be the person who executed the foregoing instrument in behalf of the State of Minnesota, and acknowledged that he executed the same as the free act and deed of the State of Minnesota.

**ROAD CLOSING - SPECIAL PERMITS**  
**Warroad Area By John Stanton**

During spring break up Warroad Area restricts use of its 200 mile road system to all vehicles because heavy trucks are not the only source of damage. In 1987 a spring road restriction program was started. Roads were signed with portable signs as closed or restricted with weight limits.

Now most roads are closed during spring break up by placing metal signs on permanent posts at the beginning of the road. Local newspapers and adjacent Areas are notified of these closings.

Special use is allowed with a Special Permit (Fig. 1). Permits are printed on colored paper with a different color each year.

Roads susceptible to damage after break up are gated to allow ATV's, but exclude vehicular traffic. These roads are signed to welcome foot travel for hikers and hunters.

Gates on roads serving homes are locked with two locks, letting either the DNR or home owner open the gate.

Conservation Officers are given keys to all gates. They appreciate this road closing policy as it gives them probable cause to stop any road user and ask them for their permit. This also helps enforcement of road closure.

Problems to avoid with this type of policy are: lost or vandalized signs, enforcement is difficult, timing of closing and opening roads, uniform Area policy on issuing permits, too many keys given out and the possibility of locking someone behind a gate.

# STATE FOREST ROAD MANUAL

## SPECIAL ROAD PERMIT

### SPECIAL PERMIT

Permittee's Name	Permittee's Address
<b>TERM OF PERMIT</b> From:(Hour, Day, Month, Year)	To: (Hour, Day, Month, Year)

EACH DAY BETWEEN THE HOURS OF \_\_\_\_\_ and \_\_\_\_\_, you have written permission to use \_\_\_\_\_ FOREST ROAD.

Signature of Forest Officer	Date
-----------------------------	------

I agree to use all possible care and assume responsibility for all damages which may result under this permit. The Department of Natural Resources shall have the right to revoke this permit at any time. This permit will take effect immediately.

Signature of Permittee	Date
------------------------	------

**THIS PERMIT MUST BE IN YOUR POSSESSION**



STATE OF MINNESOTA  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF FORESTRY

July 2, 1990

CIRCULAR LETTER TO: ALL PERSONNEL

SUBJECT: DELETING A STATE FOREST MANAGEMENT ROAD FROM INVENTORY

State Forest Roads serve a variety of users and are managed by a variety of methods. Many roads serve multiple uses which are provided or maintained by other DNR divisions, or cooperating land management agencies. These managing agencies needs should be considered before removing a road from inventory. Each road presents a unique situation and must be considered on its own merits. The following are several management alternatives to consider when deletion is anticipated.

CLOSURE is a method of management that allows future access by the State, without removing it from inventory. Physical barriers and signs will accomplish this objective and reduce surface maintenance.

TRANSFER is a means of deleting a road from the state forest road inventory while still allowing access. This requires someone else to take over maintenance. If Forestry needs to use the road periodically, it should remain on the access inventory as a Category B road. When transferring a road the Field Station will need to fill out a state forest road undesignation form (see pages D - 30 and D - 31), have it signed by the Commissioner and recorded in the County Courthouse. After the undesignation is completed an agreement should be entered into with the agency that we are transferring the road to (see page D - 25).

ABANDONMENT is of the State's interest in a road or trail eliminates any future use. Abandoned roads will be undesignated and removed from the state forest road inventory. They should be posted as closed, or non-maintained if DNR does not own the land. This will inform the public there is no longer public vehicular access via this route. The posting may be removed later if an effective barrier can be installed or the road becomes sufficiently re-vegetated to prevent access. When abandoning a road you must also fill out a state forest road undesignation form, have it signed by the Commissioner

## STATE FOREST ROAD MANUAL

and recorded in the County Courthouse. Contact the Forest Road Specialist for assistance.

When considering abandonment of a road, the State Forest Road Specialist should be notified before any other agency, and copies of all correspondence sent to the specialist. It is his responsibility to involve the Attorney General's Office at the appropriate time in the process.

The manner in which a road was developed, used, and managed will place it in one of several categories. When transfer or abandonment is being considered, decide which of the following categories apply and follow the steps listed.

### **Roads located on State or Mixed Ownerships or Established Six Years or More (All Road Classes)**

- Step 1. If an Area decides a road is no longer needed for fire access or other management activities, they should request approval from the Regional Forest Supervisor to transfer or abandon it.
- Step 2. If approved, the Regional Forest Supervisor notifies the Regional Administrator and the Director of Forestry to initiate an interdisciplinary review of the proposed action. A thirty-day or longer response period will be allowed.
- Step 3. The regional review comments should be sent to the Director of Forestry who will notify the Assistant Commissioner for Operations of the proposed. The road abandonment will be discussed at a Division Directors meeting.
- Step 4. At the close of this review period the Regional Forest Supervisor will evaluate the Department's comments and inform the Area of any action necessary.

FOR ROADS ENTIRELY ON STATE LAND GO TO STEP 7

MIXED OWNERSHIPS AND OTHER GOVERNMENTAL UNITS CONTINUE TO STEP

- Step 5. When mixed ownerships are involved, transferring the road to another government agency should be considered rather than abandoning the road. The Area should contact them in writing and ask them if they are interested in taking over the road,

because we intend to stop maintenance by \_\_\_\_\_, \_\_\_\_\_, 19\_\_\_\_. (Form Letter 1)

WHEN PRIVATE LANDS NOT INVOLVED SKIP TO STEP 7

- Step 6. Notify affected land owners of the decision to transfer or abandon the road at the same time that government agencies are notified. The letter should say DNR has contacted local government units about transferring the road to them. They should be advised that we cannot maintain the road for private use and should contact their local unit of Government about taking over maintenance. (Form Letter 2)
- Step 7. The Area should notify the public of our intent to transfer or abandon the road. This is not a legal requirement but should be done for public courtesy. Interested groups such as sportsmen should be sent an informational letter like the one sent to affected land owners. A news release should be sent to the local papers and a public meeting may be advisable if the abandonment is controversial.
- Step 8. When all notifications have been sent and resulting correspondence satisfactorily answered, the AGO's office will be asked for final approval to transfer or abandon the road. Once approved, appropriate measures will be taken to delete the road for good.

ROADS TRANSFERRED TO ANOTHER DIVISION OR AGENCY

- Step 9. If another agency agrees to take over a road, the Area will obtain a signed documentation of this action. For counties or townships a board resolution is required. The Commissioner or his delegate, must sign for the state. For federal agencies it is the regional office.

- Step 10. Complete the transfer and then stop DNR maintenance as per the agreement with the agency it is being transferred to. Remove all DNR signs and other property. Proceed to Step 14.

ROADS ABANDONED ON STATE OR MIXED GOVERNMENT OWNERSHIPS

- Step 11. Cease maintenance and post the road as CLOSED. A road cannot be blocked unless we own the land. Block at the entry to State land and go to Step 14.

## STATE FOREST ROAD MANUAL

### ROADS ABANDONED WITH MIXED PRIVATE OWNERSHIPS - WITHOUT RECORDED INTERESTS

- Step 12. Discontinue maintenance and post the road as NOT MAINTAINED at the beginning of the road and ROAD CLOSED at the boundary of State land. A road cannot be blocked unless we own the land. Block the road on state land beyond the last private landowner. If private landowners must cross state land to reach their property, check the records insure that they have a lease or easement to cross state lands. If they do not, the landowner should be contacted and told that they must get a lease or easement to cross state land. Go to Step 14.

### ROADS ABANDONED WITH MIXED PRIVATE OWNERSHIPS -WITH RECORDED INTERESTS

- Step 13. Follow Step 12 (above) and fill out a state forest road undesignation form and have it signed and recorded to abandon or delete the states easements or interests in the road. Road ownership will revert to the landowners, clearing titles and leaving their property unencumbered by the interest or easement. (Form Letter 3)
- Step 14. Send letters to all parties and respondents to show the final dispensation of the road. (Form Letters 4 and 5)
- Step 15. Revise the road inventory and send a copy to the Region and St. Paul.

(date)

Form Letter 1  
County Commissioners, including Land and Highway  
Township Board  
Federal Agency Administrator

Dear

The Minnesota Department of Natural Resources (DNR) has been maintaining the \_\_\_\_\_ state forest road for several years. This road serves lands which are managed by your agency.

The DNR plans to abandon this road because it is no longer needed for our management. As you know the DNR is not authorized to maintain roads as a "public road authority."

The DNR is willing to turn this road over to your agency to serve the needs of land you manage next to it. Please evaluate your agencies need for this road access and let us know whether you are interested in it.

If you are interested in taking over this road, please send us a copy of a Board Resolution (letter of intent from federal agencies) stating your willingness to accept the road. Please address all correspondence to \_\_\_\_\_, Area Forester, DNR Forestry, \_\_\_\_\_, MN, \_\_\_\_\_, phone (218) \_\_\_\_-\_\_\_\_.

The DNR will cease all maintenance of the \_\_\_\_\_ road in \_\_\_\_\_ days from the date of this letter. If no action is taken by you, ROAD CLOSED signs will be posted when maintenance is discontinued.

Sincerely

Area Forester  
Division of Forestry

## STATE FOREST ROAD MANUAL

(date)

Form Letter 2  
Private Land Owners  
Along the road in question

Dear

The Minnesota Department of Natural Resources (DNR) is planning to abandon the \_\_\_\_\_ state forest road because we no longer have a need for it. This road serves as access to land which you own in \_\_\_\_\_ county.

The DNR is not authorized to maintain roads as a "public road authority." We have offered to turn this road over to the \_\_\_\_\_ (township or county or other primary land owner) to serve the needs of that agency and the landowners next to the road. Please contact these officials and ask them to consider your interests in their decision to accept or reject this road. They must notify the DNR of their intentions within \_\_\_ days of this letter.

The DNR will cease all maintenance of the \_\_\_\_\_ state forest road on \_\_\_\_\_19\_\_\_\_. If no action is taken by the \_\_\_\_\_(agency), we will place **NOT MAINTAINED** signs at the start of the road, and it will be closed where it crosses state lands. If you must cross state lands to get to your property and do not have a lease or easement to cross state lands, please contact me to apply for one.

If you have questions on this matter please address all correspondence to \_\_\_\_\_, Area Forester, DNR Forestry, \_\_\_\_\_, MN, \_\_\_\_\_, phone (218) \_\_\_\_-\_\_\_\_.

2

Sincerely

Area Forester  
Division of Forestry

(date)

Form Letter 3  
Land Owners with Easements  
No other agency to take over

Dear Sir:

This letter is to confirm our earlier communication regarding the DNR abandonment of the \_\_\_\_\_ state forest road, in \_\_\_\_\_ County.

Through a series of meetings and correspondence with various landowners, agencies and interested groups, the DNR has indicated they no longer need this road. The date for cessation of maintenance and interest has now past. As stated earlier, the DNR holds no further interest or rights to the use of this road. It shall now be removed from county and state records.

No interest has been expressed by the \_\_\_\_\_ County Land Department (county highway department, township or other agency) to assume responsibility for continued maintenance of this road. All further inquires should be referred to the appropriate agency.

The state has filed the attached quit claim deed with the county recorder to free your property of the easement which we had previously acquired. Your title is no longer encumbered with this easement.

Thank you for your interest in this process.

Sincerely,

Area Forester

## STATE FOREST ROAD MANUAL

(date)

Form Letter 4

Land Owners

Where no easements exist or

Another agency has agreed to take over the road.

Interested Persons

Dear Sir:

This letter confirms our earlier communication regarding the DNR abandonment of the \_\_\_\_\_ state forest road, in \_\_\_\_\_ County.

Through a series of meetings and correspondence with various landowners, agencies and interested groups, the DNR has indicated the road is no longer needed. The date for cessation of maintenance and interest has now past. As stated earlier, the DNR holds no further interest or rights to use this road. It will now be removed from county and state records.

There has (or has not) been interest expressed by the \_\_\_\_\_ County Land Department (county highway department, township or other agency) to assume responsibility for continued maintenance of this road. All further inquiry about this road should be referred to the appropriate agency.

Thank you for your interest in this process.

Sincerely,

Area Forester



(date)

Form Letter 5  
County Commissioners (include Land and Highway)  
Town Board  
Agency Administrator

Dear Sir:

This letter is to confirm our earlier communication regarding the DNR abandonment of the \_\_\_\_\_ state forest road, in \_\_\_\_\_ County.

Through a series of meetings and correspondence with various agencies and interested groups, the DNR has indicated the road is no longer needed. The date for cessation of maintenance and use has now past. As stated earlier the DNR has no further interest in maintaining this road. It shall now be removed from the county and state records, and closed. There has (or has not) been interest expressed by the \_\_\_\_\_ county land department (county highway department, township or other agency) to assume responsibility for the continued maintenance of this road.

Thank you for your interest in this process.

Sincerely,

Area Forester

## STATE FOREST ROAD MANUAL

### ROAD AGREEMENT CONVERTING LAKE BELTRAMI STATE FOREST ROAD TO A TOWNSHIP ROAD

This Agreement is made this 20th day of August, 1991 by and among the State of Minnesota, Department of Natural Resources, through its Commissioner (DNR); and Northern Township (147-33), Beltrami County, and Turtle Lake Township (148-33) Beltrami County, State of Minnesota, through their respective officials.

WHEREAS, it is the intention of the parties to this agreement that part of the existing Lake Beltrami State Forest Road (forest road) lying in Northern and Turtle Lake Townships generally described as the existing road being in Section 1, Township 147 North, Range 33 West (Northern Township) and Section 36, Township 148 North, Range 33 West (Turtle Lake Township), Beltrami County shall be established as a township road by Northern and Turtle Lake Townships as demonstrated by the resolutions attached as Exhibits A & B; and

WHEREAS, the Townships must acquire necessary property interests from DNR and others in order to establish this forest road as a township road; and

WHEREAS, the Townships plan to repair or reconstruct the forest road after it is established as a township road; and

WHEREAS, the Lake Beltrami State Forest Road, once established as a township road, qualifies for funds to repair, reconstruct and improve it from the state park road account governed by Minnesota Statutes 162.06, subd. 5 (1990); and

WHEREAS, DNR, Division of Forestry would spend approximately Two Thousand Five Hundred Dollars (\$2,500.00) if it were to maintain the forest road to state forest truck trail standards.

NOW, THEREFORE, the parties hereby agree as follows:

I. DNR agrees to grant necessary easements across the state trust fund lands involved in this agreement. DNR, Division of Forestry, agrees to compensate the Permanent School Fund for the appraised value of the easements.

## STATE FOREST ROAD MANUAL

II. The Townships agree to designate the Lake Beltrami State Forest Road as a township road in their respective townships.

III. The Townships agree to repair and reconstruct the road, after it is designated as a township road in each township, to minimum standards as a township road with a design speed of 35 M.P.H.

IV. After repair and reconstruction is completed, Turtle Lake Township agrees to perform maintenance of the entire township road. Northern Township shall reimburse Turtle Lake Township for the cost of maintaining that part of the road located in Northern Township.

V. Each Township's total expenditure for initial repair and reconstruction of the road shall be limited to the costs of engineering and inspection performed by the Beltrami County Highway Department applicable to the portion of the road lying within that Township and each Township shall reimburse the County Highway Department for those costs. The balance of the costs shall be paid from the state park road account under the provisions of Minn. Stat. 162.06, subd. 5 (1990).

VI. All parties agree that, if sufficient funds are not obtained by the Townships for the initial repair and reconstruction of this road from the County or other sources, that the Townships shall vacate the township road, surrender their respective easements to the landowners from which they were acquired and full ownership and maintenance of the road shall revert to DNR or other landowners.

VII. Each Township agrees that it shall not vacate the township road covered by this Agreement without the written consent of the other township and DNR.

IN WITNESS WHEREOF, the parties have caused this Agreement to be duly executed intending to be bound thereby.

APPROVED:

DEPARTMENT OF NATURAL RESOURCES

By: Eugene R. Gere

Title: Assistant Commissioner  
for Administration

Date: 9/06/91

TOWN OF TURTLE LAKE

By: Kurt Kalbrener

Title: Chair, Board of Supervisors

Date: 8/20/91

# STATE FOREST ROAD MANUAL

APPROVED AS TO FORM AND EXECUTION  
HUBERT H. HUMPHREY, III  
Attorney General

ATTEST:

Laverne C. Smith

By: Andrew J. Tourville Jr.

TOWN OF NORTHERN

Title: Special Assistant Attorney General

By: Thomas R. Galarneault

Date: 9/11/91

Title: Chair, Board of Supervisors

Date: August 12, 1991

COMMISSIONER OF ADMINISTRATION

ATTEST: EDITH HEEM

TOWN CLERK

By: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

COMMISSIONER OF FINANCE  
ENCUMBERED  
DEPARTMENT OF FINANCE

BY: \_\_\_\_\_

Date: \_\_\_\_\_

## STATE FOREST ROAD MANUAL

NORTHERN TOWNSHIP  
445 TOWN HALL ROAD N. W.  
BEMIDJI, MINNESOTA 56601

Resolution #1991-b

BE IT RESOLVED that Northern Township hereby adopts as a township road that portion of the Lake Beltrami State Forest Road located within the township. The adoption of said road shall be contingent upon execution by all of the parties whose signatures are required as they appear upon the attached agreement.

Adopted by the Town Board of Supervisors of the Town of Northern the 25th day of February, 1991.

TOWN OF NORTHERN

By: Thomas R. Galarneault  
Chairman, Town Board of Supervisors

ATTEST:

Edith Heem  
Town Clerk/Administrator

EXHIBIT A

## STATE FOREST ROAD MANUAL

TURTLE LAKE TOWNSHIP  
BELTRAMI COUNTY  
BEMIDJI, MINNESOTA 56601

### RESOLUTION

BE IT RESOLVED that Turtle Lake Township hereby adopts as a township road that portion of the Lake Beltrami State Forest Road located within the township. The adoption of said road shall be contingent upon execution by all of the parties whose signatures are required as they appear upon the attached agreement.

Adopted by the Town Board of Supervisors of the Town of Turtle Lake the 3rd day of June, 1991.

TOWN OF TURTLE LAKE

BY: KURT KALBRENER, CHAIRMAN  
TOWN BOARD OF SUPERVISORS

ATTEST:

LAVERNE C. SMITH, CLERK

EXHIBIT B

## STATE FOREST ROAD UNDESIGNATION

The state forest road undesignation form which follows was developed by the Division and the Attorney General's Office to conform with the requirements of the State Forest Road Act Minn. Stat. 89.71, subd. 1.

The State Forest Road Act requires the Commissioner to "undesignate" a state forest road that is on the inventory before it can be abandoned or transferred to another party.

The form should be filled out in the Field Station and sent to St. Paul road staff for processing. After the form is signed by the Commissioner it will be recorded in the County Courthouse to show that we have abandoned or transferred our rights to the road.

If the road is being transferred to another agency or local unit of government the procedures listed above should be used.

## STATE FOREST ROAD MANUAL

### MINNESOTA DEPARTMENT OF NATURAL RESOURCES CERTIFICATION OF UNDESIGNATION OF A STATE FOREST ROAD

WHEREAS, Minnesota Statutes 89.002, subd. 3, directs the Commissioner of Natural Resources to provide a system of state forest roads which provide access to state forest land and other forest land under the Commissioner's authority to manage, protect and develop those lands and their resources consistent with the forest resource management policy, and to meet demands for forest resources; and

WHEREAS, Minnesota Statutes 89.71, subd. 1, authorizes the Commissioner of Natural Resources to designate and place on the state forest road inventory roads, bridges and other improvements to the width of actual use including ditches, backslopes, fills, and maintained right-of-ways unless otherwise specified in a prior easement of record; and

WHEREAS, Minnesota Statutes 89.71, subd. 1, authorizes the Commissioner to undesignate all or part of a state forest road that is not needed to carry out forest resource management policy and to remove it from the state forest road inventory; and

WHEREAS, the Commissioner has determined that a portion of the state forest road described below is no longer needed to carry out forest resource management policy.

NOW, THEREFORE, the portion of the existing state forest road located in \_\_\_\_\_ County, which is located over the lands described below and shown on the attached map, is hereby undesignated as a state forest road and is removed from the state forest road inventory:

<u>TOWNSHIP</u>	<u>RANGE</u>	<u>SECTION</u>	<u>FORTY/GOVERNMENT LOT</u>
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## STATE FOREST ROAD MANUAL

In addition, to removing a portion of the state forest road from the state forest road inventory, the Department intends hereby to: (check only one)

- Release all of the state's rights and interest in the right-of-ways and easements for the portion of the state forest road described above.
- Reserves all of the state's rights and interest in the right-of-ways and easements for the portion of the state forest road described above for use by the state or for subsequent transfer to another unit of government for road or access purposes.

Date: \_\_\_\_\_

RODNEY W. SANDO  
Commissioner of Minnesota  
Department of Natural Resources

STATE OF MINNESOTA )

)ss:

COUNTY OF RAMSEY )

On this \_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_, before me a Notary Public within and for said county, personally appeared RODNEY W. SANDO, Commissioner of the Department of Natural Resources, State of Minnesota, to me known to be the person described and who executed the foregoing instrument and who acknowledged that he executed the same as the free act and deed of the State of Minnesota.

\_\_\_\_\_  
Notary Public







**E. POLICY**

## STATE FOREST ROAD MANUAL

### CIRCULAR LETTERS

At the present time the following circular letters are in effect for the Forest Roads program:

NUMBER	DATE	TOPICS	STATUS/ COMMENTS
2960	4-3-79	Project proposals Permits & easements Closures Abandonment Classification	OK until a new form is created OK except easement- see easements Good Draft written but not yet adopted - AGO Needs Revision to 6 classes
2960-2	10-20-60	Legal - Town Roads	Needs revision with AGO help
2960-3	10-15-70	Funding - trust	OK
2960-4	3-2-54	Seasonal closure	Needs Revision
2960-5	Draft	Inventory	Proposed not yet adopted
2960-6	7-12-88	Road Numbering	See Inventory section
2960-7	Draft	Road Abandonment	Draft needs AGO approval

File 2960-5  
Draft

STATE OF MINNESOTA  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF FORESTRY

June 7, 1988

CIRCULAR LETTER TO: ALL PERSONNEL

SUBJECT: ROAD INVENTORY

PURPOSE

A road inventory is needed to efficiently develop and maintain the State Forest Road System. Growth or reduction in the road system will be determined by the demand for access from a variety of users. Integrated resource management requires coordination between disciplines and identification of resources. A good inventory can be used for long term planning, can identify easement and right-of-way needs, or identify the need for closure and development on the system.

A complete inventory will help make decisions on road use policy and funding requirements for maintenance, construction and reconstruction projects. Use of a cost accounting system can help identify how funds were spent on individual road segments. It can also be used to help identify problem areas and to develop adequate maintenance scheduling. Road segmentation will also simplify contracting and record keeping for maintenance projects.

Road users will benefit from maps developed from the inventory and signing of the road system after the inventory is completed.

PROCEDURES:

I. Roads to be Inventoried.

The State Forest Road Inventory will include all roads and trails which serve forestry

## STATE FOREST ROAD MANUAL

administered lands. It will also include all other roads and trails which are currently governed by division management or easement. These roads will be categorized into Classes 1 to 6 as defined in the revised 1982 Forest Road Plan. Some roads may not have been constructed or maintained by forestry. These roads need to be inventoried because they provide critical access for management, now or in the future.

These roads may also provide critical seasonal access to state forest land from state, county, or township roads, or across other ownerships. The inventory is intended to identify current access and is not intended to claim or assume any responsibility or maintenance of the inventoried roads. Many roads may have been maintained because of repeated use by recreational users following early logging or homesteading. In some cases the road right of way may be more important than the physical condition or existence of a road. Division policy may dictate the restricted use of some portions of the road system during some seasons.

There are three major categories of roads to be identified:

- A. All roads or trails in Class 1 to 6 that serve state forest lands or now controlled by the Division and meet one or more of the following criteria:
  1. A road which is needed for future resource management.
  2. A road which provides a critical access point (i.e. highway approach or high ground access through a wetland).
  3. Any road or trail that we may later want to upgrade.
  4. A road corridor which has been or may be once in a while reopened during a 15 to 20 year period. Opening will be done by brushing, blading, or dozing the access (i.e. a freeze down road or skid trail).
  5. A road corridor being used where the Division of Forestry has or should secure an easement, use permit, or use agreement. Roads in this category will be inventoried in detail to provide management information. If there are critical roads in category B or category C which should be administered by Forestry, they should be inventoried as category A roads.



B. Roads or trails built by other divisions, government agencies, railroads, industrial forest landowners, and other private landowners, should be included if they provide access to forestry administered lands and are not currently numbered, inventoried, or administered by another government agency. If one or more of the following criteria applies:

1. Any road which is needed for future resource management.
2. A road which provides a critical access point (i.e. highway approach or high ground access through a wetland).
3. A road having or requiring easements or special use permits to get to or from state lands.

Roads in this category will be inventoried by collecting limited information on ownership, dates of construction and use restrictions. The data for many of these roads will come from existing maps.

C. Roads or trails that are inventoried (numbered roads), maintained and controlled by other government agencies that serve forestry administered lands and meet one or more of the following criteria:

1. A road which is necessary for future resource management.
2. A road which provides a strategic access point to a highway approach or high ground access through a wetland.
3. A road having or requiring easements or special use permits from the state.

Roads in this category are included primarily for planning purposes. These roads will be inventoried with limited information concerning ownership, dates of construction and use restrictions. The data for many of these roads will come from existing maps.

As additional inventory needs are identified, roads should be added to the inventory. Roads or trails which are not inventoried will probably be closed to motorized use.

II. Items to be inventoried:

## STATE FOREST ROAD MANUAL

The items to be inventoried will vary by the category the road fits into. Instructions for doing the road inventory are found in the road inventory segment of the Forest Road Manual.

Questions concerning this procedure should be directed to the Division's Road Program Coordinator.

Gerald A. Rose, Director  
Division of Forestry

# STATE FOREST ROAD MANUAL

## OPERATIONAL ORDERS

At the present time the following Department Operational Orders apply to Forest Roads:

NUMBER	DATE	TOPIC	STATUS & COMMENTS
6	7-5-77	Land Acquisition	OK - easements
18	5-27-75	Excess Property	OK - grader acquisition
28	10-17-79	BOE Plan Review	OK - good for Forestry too
30	2-26-75	Region Land Spec.	Needs some revision
34	11-1-85	Protected Waters	OK - permit process
37	3-15-82	Eng. Requisitions	OK -
40	8-1-85	PERT review	OK - projects effecting other disciplines
43	8-1-87	Contracting	Rescinded - now in DNR Admin manual NR 04:60 & Field Services Procurement Manual
59	4-89	Pesticide Use Policy	Will be revised in 1993.
68	10-27-82	Forms	OK - procedures for new forms
83	12-22-86	Explosives Handling	OK - explosives use & certification

Copies of these Orders are contained in the Operational Order Manual and are not reprinted here.

### BMP'S

#### Best Management Practices for Water Quality in Forest Management in Minnesota

The Division of Forestry has adopted these as Standard Operating Procedures and the Department is expected to comply with them as well. The manual and training have been provided to all Division staff and serve as an excellent reference for many practices.

## STATE FOREST ROAD MANUAL

### AREA FOREST ROAD COMMITTEES

Area Forest Road Committees are established by the 1988 Forest Road Act. Committee participants are listed in the Act in the legal section of the manual. It is desirable to extend this to include:

Road staff from all areas in the county, area staff from Wildlife and Trails, other landowners (USFS, Tribal). Representation of recreation interests must come from outside the department. This may be resort associations, hunting/wildlife groups, or trail riding groups, but should be representative of all recreation interests in Area.

Some topics to be covered at the annual (or more frequent) meetings should include:

1. DNR road construction plans.
2. DNR road maintenance scheduling.
3. DNR timber harvest plans (sales) and anticipated hauling routes/schedules.
4. County timber harvest plans (sales) and anticipated hauling routes/schedules.
5. Forest Service timber harvest plans (sales) and anticipated hauling routes/schedules.
6. Industry timber harvest plans (sales) and anticipated hauling routes/schedules.
7. Possible conflicts with trails and road use.
8. Opportunities to cooperate on road issues.
9. Mapping and identification of road ownerships and locations.
10. Road restrictions and closure. Reasons and seasons.
11. Identify roads which are necessary to maintain open for forestry/recreation needs.
12. Standardize signing for such items as road maintenance, trucks hauling.

13. Define purposes of roads which are proposed.
14. Coordination of access between agencies/owners.
15. Transfer possibilities for roads.
16. Impacts on public roads.
17. Public road impacts on forest operations.
18. Permit and notification procedures for road use.
19. Technical exchange of ideas.
20. Recreational impact.
21. Other participant concerns.









F. LEGAL

## STATE FOREST ROAD MANUAL

### PERMITS REQUIRED FOR ROAD PROJECTS

TYPE	APPLICANT	ISSUING AGENT	PURPOSE
Waters	Area Forester	DNR Waters	For work in streams, protected waters and protected wetlands. See Executive Order 91-3 in Policy section.
404	Roads Program Staff	US Army Corps Engineers	For fill placement in seasonal or other wetlands. May not be necessary for most projects which are for forest management or silviculture. Good practice to provide notification regardless.
Governors Executive Order #91-3	None	None	No permit is necessary, but you must comply with what is spelled out in the Order. No filling or draining of a wetland without mitigation.
Wetland Conservation Act	None	None	No permit is necessary from a local unit of government, but we must follow the law and the rules when constructing roads or doing silviculture.
SHPO	Roads Program Staff	State Archeologist	To protect cultural resources. May take investigation by an archeologist. Time consuming in some locations.
County HWY	Roads Program Staff	County Engineer	For access onto a County (Town) road.
MN/Dot	Roads Program Staff	MNDot District Engineer	To allow access onto a State or Federal Highway.
Special Use	Roads Program Staff	USFS or County Land Dept	To provide for crossing other government ownerships on a short term basis.
Pipeline or Utilities	Roads Program Staff	Utility Company	To permit crossing of buried pipelines. This can a critical safety issue. Call Minnesota One Call for all buried utilities 1-800-212-1166.
Permission Letter	Area Forester	Owner / Agency	Only for use of extremely short duration (3 months or less).
Forestry Wildlife Guidelines	Roads Program Staff	None	Consult with the area wildlife manager on road projects. Follow wolf management road density guidelines in the timber wolf range.

The DNR Division of Waters has developed a Joint Notification Form that can be filled out and sent to them. They in turn will send copies of the form to all other wetland regulators for their review. Review can take 60 to 90 days so send this in well before your project will start. Contact Division of Waters for this form.

FOREST ROAD ACT OF 1988 HIGHLIGHTS

- \* M.S. 89.001 Subd. 14 - Defines a "State Forest Road".
- \* M.S. 89.01 Subd. 7 - Establishes road committees to coordinate development of roads.
- \* M.S. 89.19 - Allows commissioner to establish rule governing forest roads.
- \* M.S. 89.70 - Establishes forest road account for forest roads.
- \* M.S. 89.71 Subd. 1 - Designates state forest roads to their existing width as legal forest roads even without easements.
- \* M.S. 89.71 Subd. 2 - Provides for acquisition of rights-of-way and easements.
- \* M.S. 89.71 Subd. 3 - Provides for development of construction specifications.
- \* M.S. 89.71 Subd. 4 - Allows inclusion of highway statutes in adoption of rules.
- \* M.S. 89.71 Subd. 5 - Allows for posting of Forest Roads as Minimum Maintenance roads.
- \* M.S. 89.71 Subd. 6 - Commissioner may convey unneeded roads to other Governments.
- \* M.S. 89.71 Subd. 7 - Commissioner is not a road authority under highway laws.
- \* M.S. 89.72 Creates a county forest access road account
- \* M.S. 1986, section 296.16 Subd. 1 a - determines that \$675,000 of the un-refunded gas taxes is generated by use of forest roads as follows; \$400,000 to state forest roads and \$275,000 to county forest access roads.
- \* M.S. 1986, section 296.421 Subd. 8 - Appropriates \$400,000 from the un-refunded gas tax used to operate vehicles on forest roads for maintenance of these roads.
- \* Laws of 1987, chapter 404, section 44 subd. 4 - Deletes the 1988 logging use study.
- \* Laws of 1988, chapter 686, section 10 - Requires a study of road use on state forest roads from May 1, 1988 to April 30, 1989, with a report on October 1, 1989.
- \* Laws of 1988, chapter 686, section 11 - Requires a study of road use on county forest access roads from May 1, 1988 to April 30, 1989, with a report on October 1, 1989.

## STATE FOREST ROAD MANUAL

### MINNESOTA COUNTY AND TOWNSHIP PERMIT RESPONSIBILITIES FOR ROAD, CULVERT, & BRIDGE CONSTRUCTION

#### I. WHEN ARE PERMITS REQUIRED?

##### A. Any work involving:

1. Placing fill in a wetland, water course or water body.
2. Changing the course, current, or cross section of any of Minnesota's Protected Waters or Water Courses.

B. Permits are not required from the Minnesota DNR or Corps for Engineer in man-made drainage ditches.

However, you will probably have to get a permit from the County Drainage Authority or Watershed District.

##### C. Typical actions requiring a permit from one of the agencies listed below.

1. Placing a new culvert.
2. Replacing a culvert.
3. Constructing a roadway across a water course or wetland.
4. Constructing a bridge.

##### D. If in doubt as to whether a permit is required or not, call one of the following:

1. Local Minnesota DNR Area Hydrologist.
2. St. Paul District Corps of Engineers.
3. Local Watershed District.

4. County Drainage Authority.
5. Soil and Water Conservation District

## II. WHAT KINDS OF PERMITS ARE REQUIRED?

### A. Minnesota Department of Natural Resources

- \* Work involving Protected Waters of the State of Minnesota

### B. U.S. Army Corps of Engineers (St. Paul)

- \* Work involving placing fill in any wetlands of the United States. Currently the Corps has issued nation-wide or regional activities for forest roads and silviculture. Contact them to see if they apply to your project.

### C. Local Watershed District

- \* If located within an official Watershed District, a permit is usually required from the District.

### D. County Drainage Authority

- \* Work involving any legally established County or Judicial Ditch system should be coordinated with the County

### E. Governors Executive Order/Wetland Conservation Act

- \* Work involving draining or filling of a wetland. No permit required but you must mitigate all actions.

## III. WHERE DO WE GET FORMS AND APPLY? CALL YOUR:

- A. Local Minnesota DNR Area or Regional Hydrologist
- B. St. Paul District Corps of Engineers
- C. Local Watershed District
- D. County Drainage Authority or Auditor

E. Soil and Water Conservation District

#### IV. WHAT KINDS OF INFORMATION ARE REQUIRED?

- A. Hydraulic analysis of bridge or culvert.
- B. Amount of fill to be placed.
- C. Impacts on water course or wetland.
- D. Other information depending on the project.

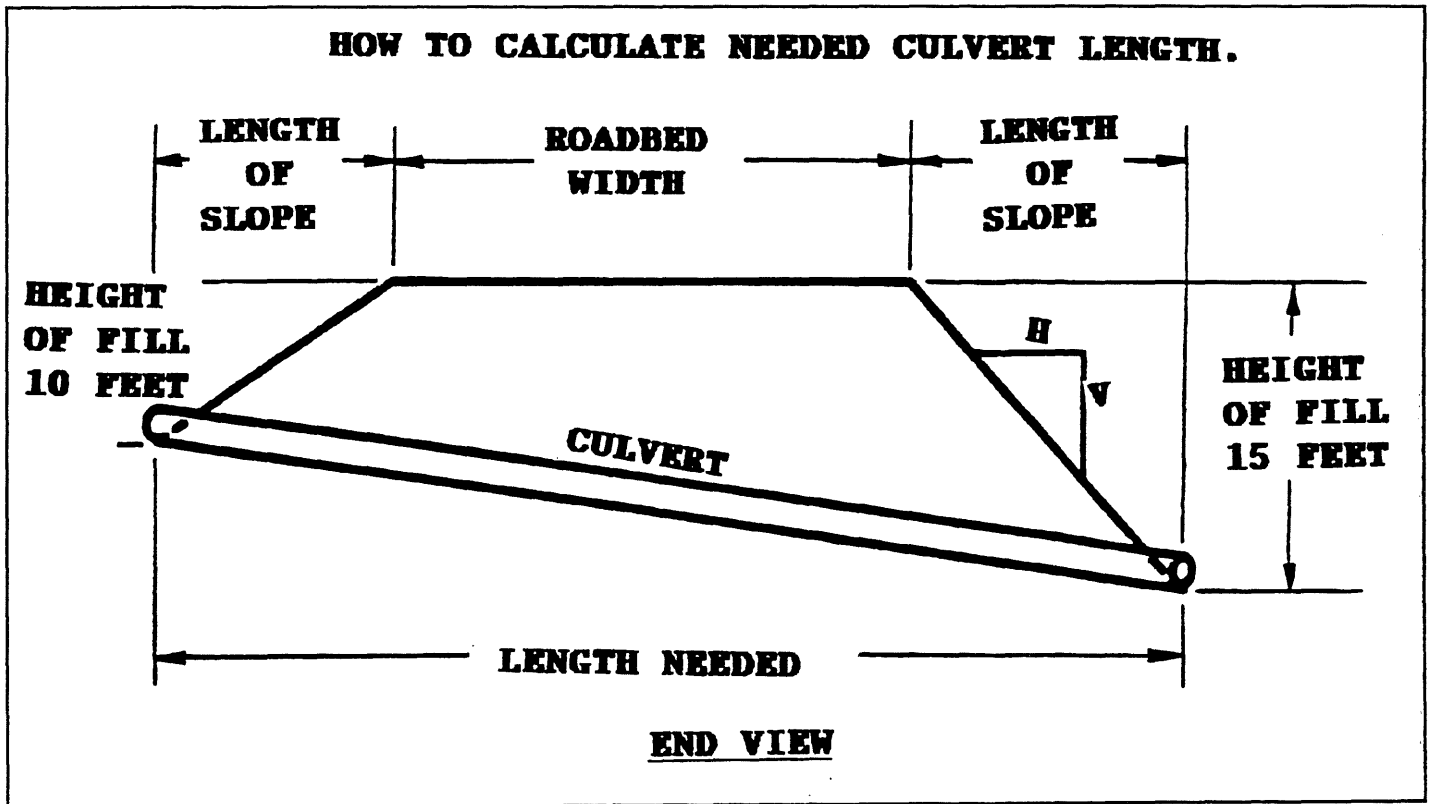
#### V. HOW LONG DOES IT TAKE?

- A. DNR Permit 30 days
- B. Corps of Engineers 60 days
- C. Watershed District 30 days
- D. County 30 days

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\* These time estimates assume little or no problems with the project. They will probably take longer!

\* Start the Permit Application Early to avoid holding up the project.



Left slope equals 3:1

Right slope equals 2:1

Length of slope on the left equals: The horizontal length, of the slope ratio on the left, times the height of the fill on the left.

10 feet (Height of fill on left)  
x 3 feet (Horizontal length of slope ratio on left)  
30 feet (Length of slope on the left)

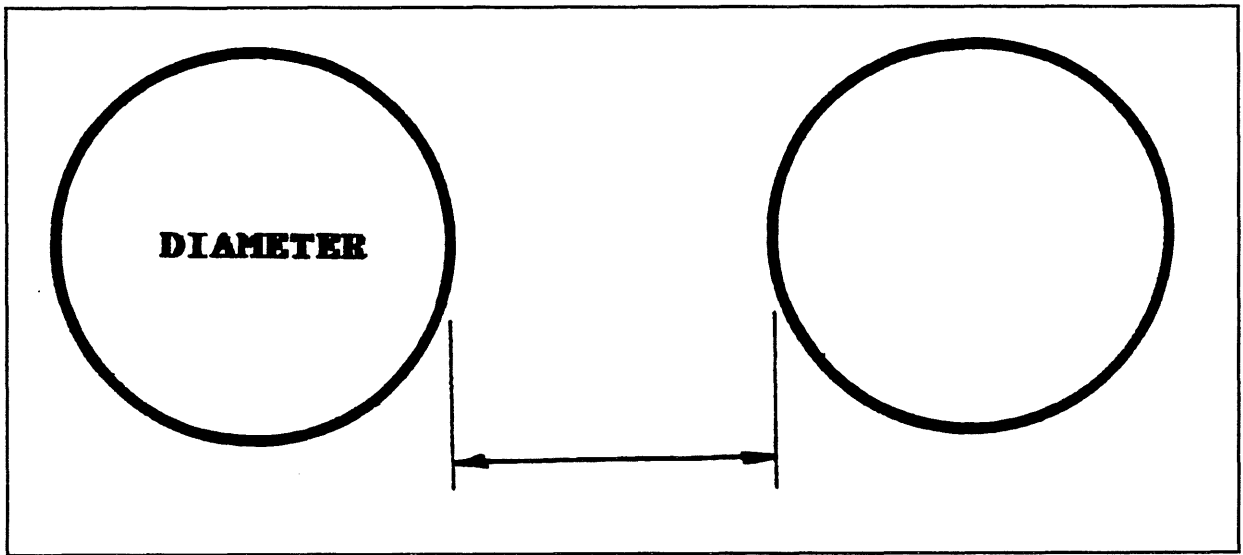
Length of slope on the right equals: The horizontal length of the slope ratio on the right, times the height of the fill on the right.

15 feet (Height of fill on right)  
x 2 feet (Horizontal length of slope ratio on right)  
30 feet (Length of slope on the right)

Total length needed equals:

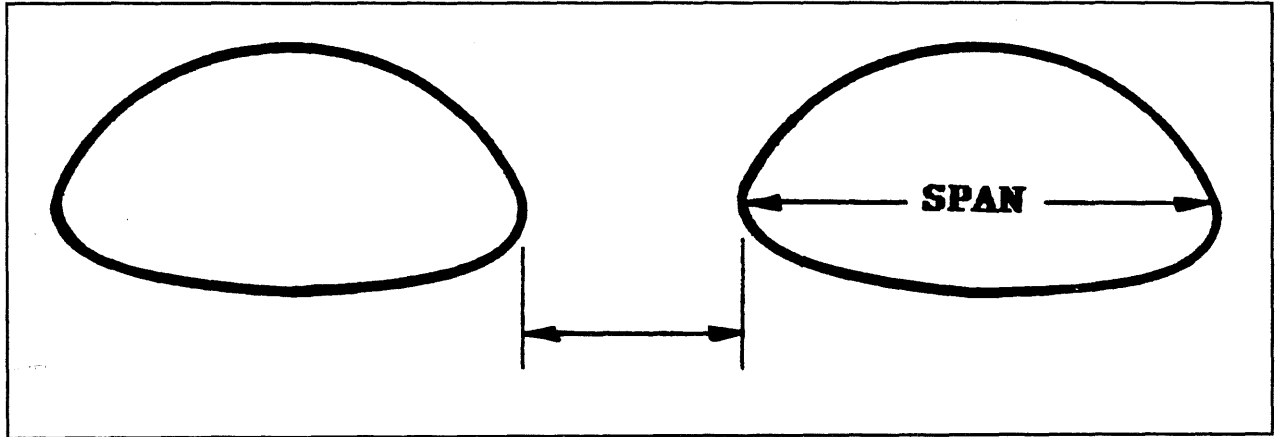
- 30 feet (Length of slope on the left)
- 24 feet (Roadbed width)
- 30 feet (Length of slope on the right)
- 84 feet (Length of culvert needed)

**RECOMMENDED MINIMUM SPACINGS  
FOR MULTIPLE PIPE INSTALLATIONS**



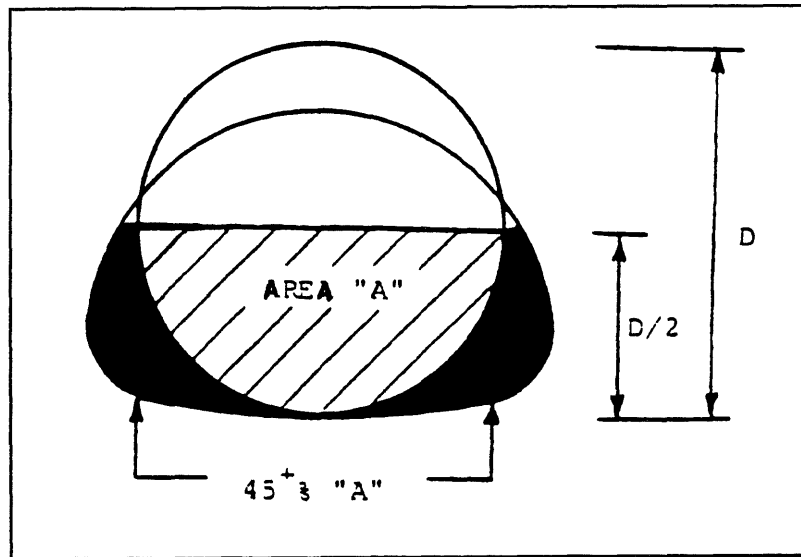
<b>DIAMETER</b>	<b>SPACING</b>
up to 24" .....	36"
24" to 72" .....	1/2 Diameter of pipe
72" and over .....	36"



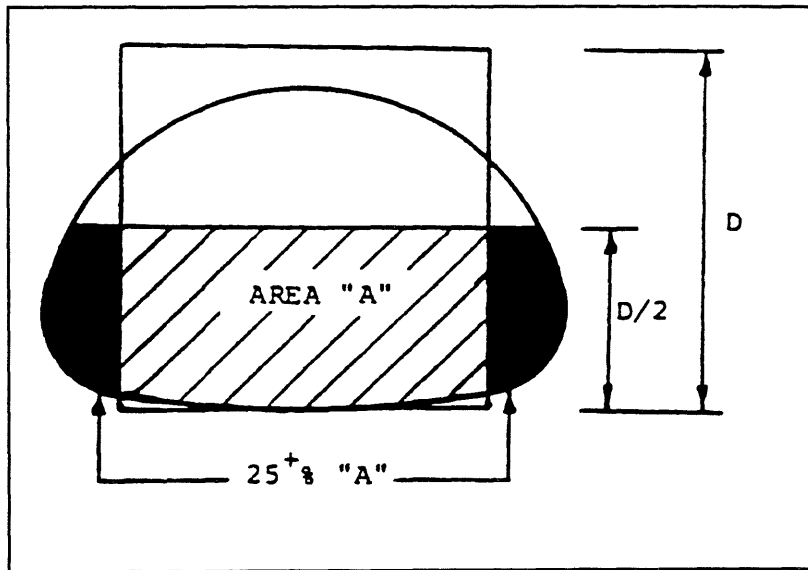


SPAN	SPACING
up to 36" .....	12"
36" to 108" .....	1/3 span of pipe arch
108" to 189" .....	36"

AREA COMPARISON OF ARCH versus ROUND AND SQUARE SHAPE - HALF FULL DEPTH

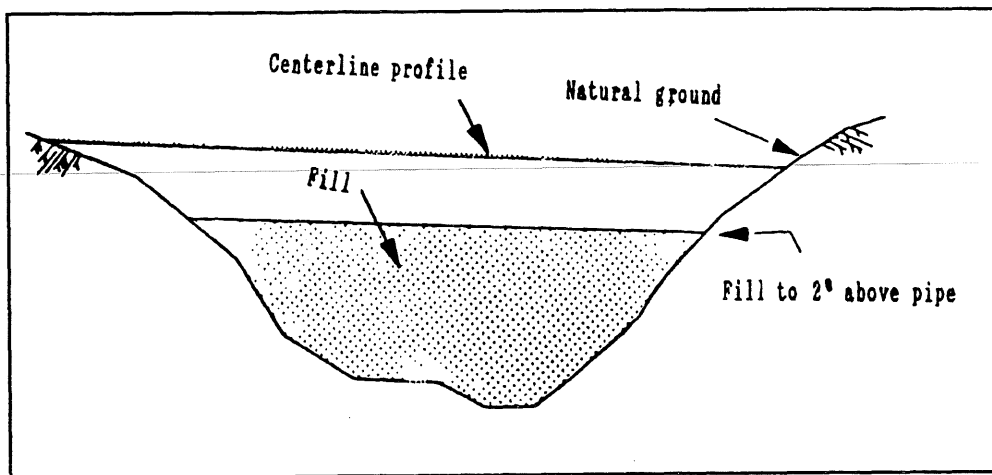


The effective area of an arch pipe is 45+% greater than the effective area of equivalent round pipe at a depth equal to 1/2 the diameter of the round pipe for 90" - 132" sizes.

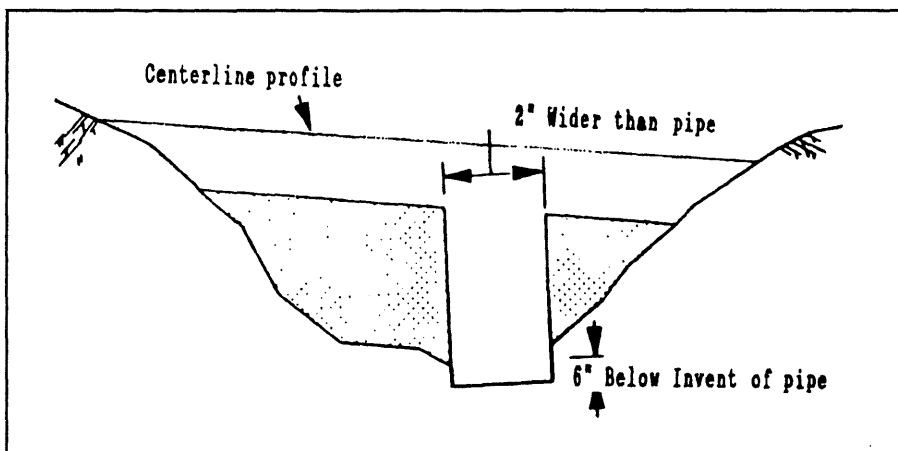


The effective area of an arch pipe is 25+% greater than the effective area of a square box culvert with approximately the same full flow area, at a depth equal to 1/2 the height of the box.

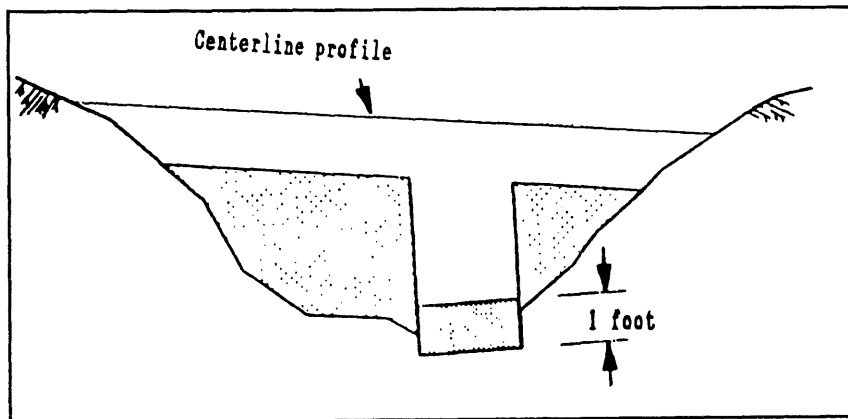
## HOW TO INSTALL A PIPE - WHAT TO DO



Step 1: Bring fill to level two feet above top of pipe. Compact in six-inch layers.

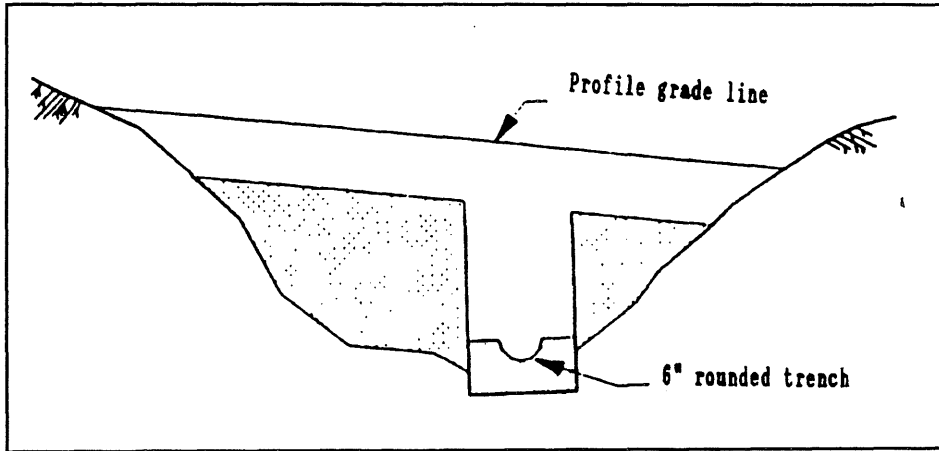


Step 2: Cut out (excavate) ditch to six inches below bottom (Invert) of pipe and one foot wider than pipe on each side of pipe.

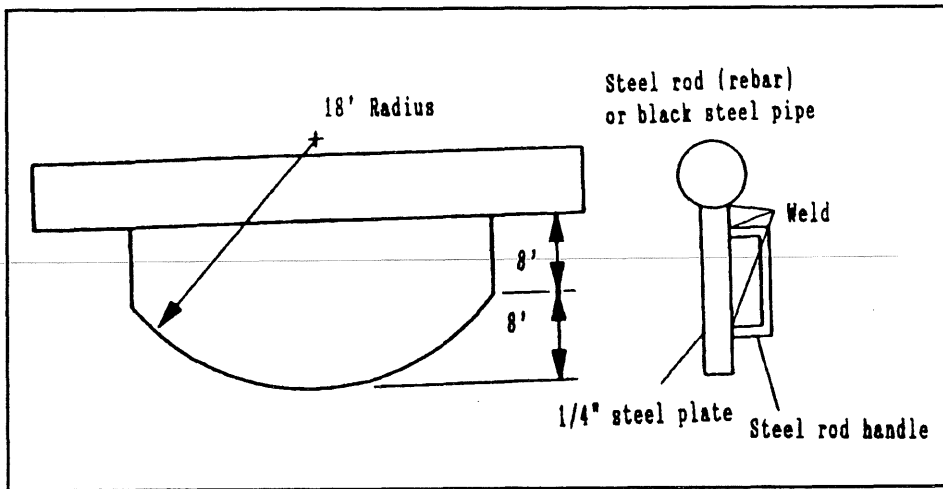


Step 3: Place gravel or sand in ditch to about six inches above invert of pipe. Compact in six-inch lifts.

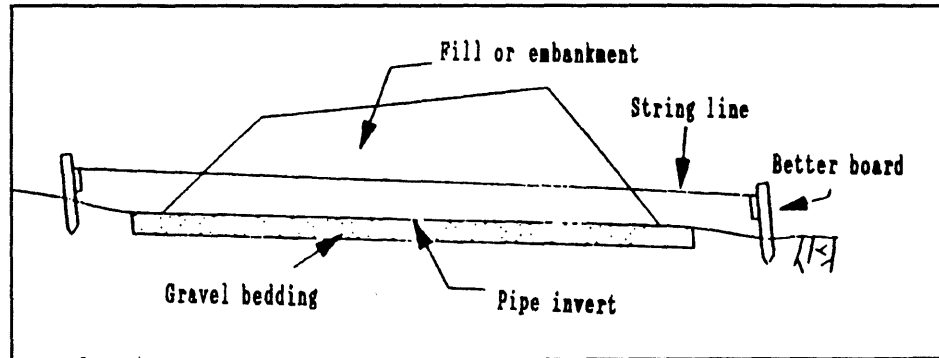
# STATE FOREST ROAD MANUAL



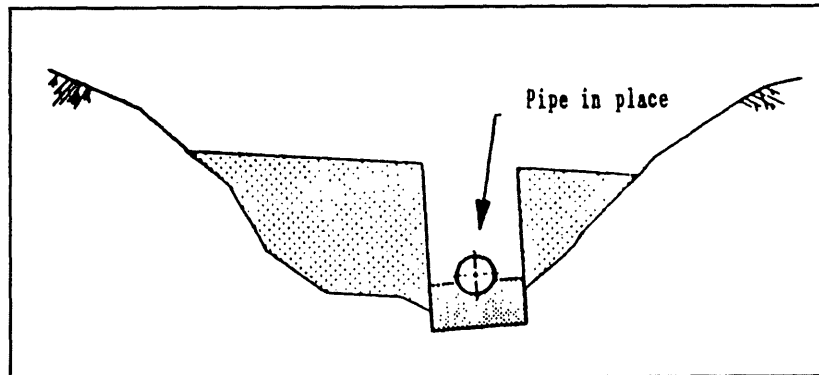
Step 4: Form rounded trench in compacted stone by removing gravel and using a template to shape. Use a template formed to diameter of pipe to be installed, i.e., 18", 24", 36", etc. Cut out for bell on concrete pipe.



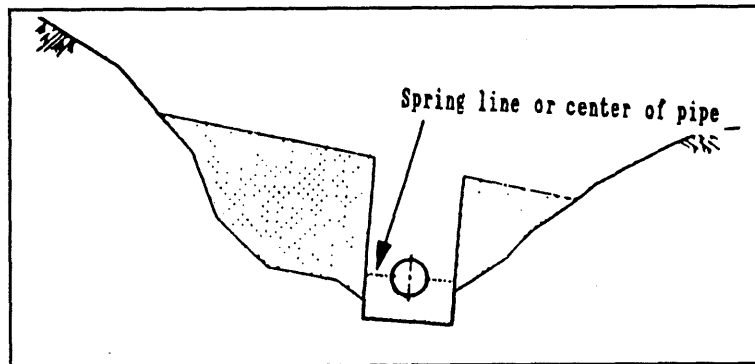
Step 5: Make template from metal or hard wood in shop on bad days.



Step 6: Check grad line of pipe using better boards and string line, laser beam, hand level, or surveying instrument.

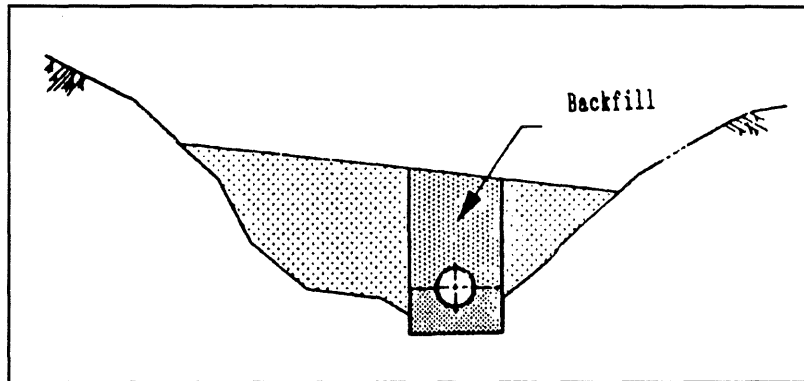


Step 7: Lay pipe in trench and seal in rounded out bedding material.

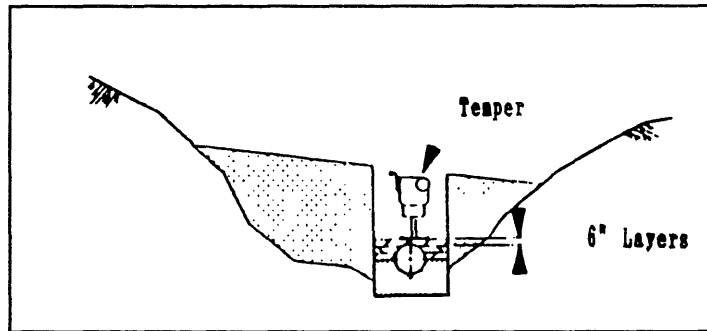


Step 8: Back fill to spring line or center of pipe with bedding material - sand or gravel. Compact in six-inch layers.

## STATE FOREST ROAD MANUAL



Step 9: Back fill trench to top with soil compacted in six-inch layers.

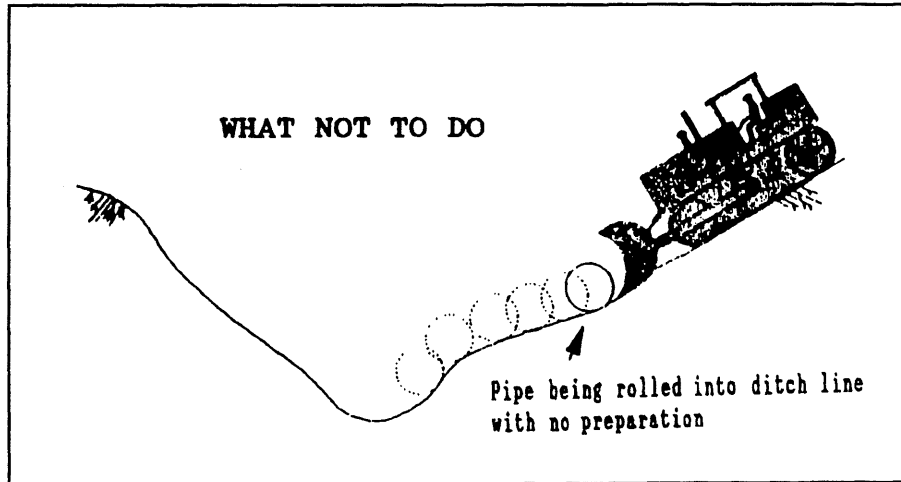


Step 10: Complete embankment to profile grade line. If properly installed, there will be no settlement over pipe!

**Tamping Around Pipe:** Air tampers, Whacker Packer. Shop made hand tampers are sufficient. Mechanical tampers save time and may do a better job. Tamp material -gravel, sand, soil in a moist state, but not too wet and never powder dry. Place material in ditch in six inch layers, thoroughly tamping each layer. Remember that bedding material is not to convey water as a French drain; its purpose is to cradle the pipe and should be compacted thoroughly. Hard toed shoes are a must; gloves probably should be.

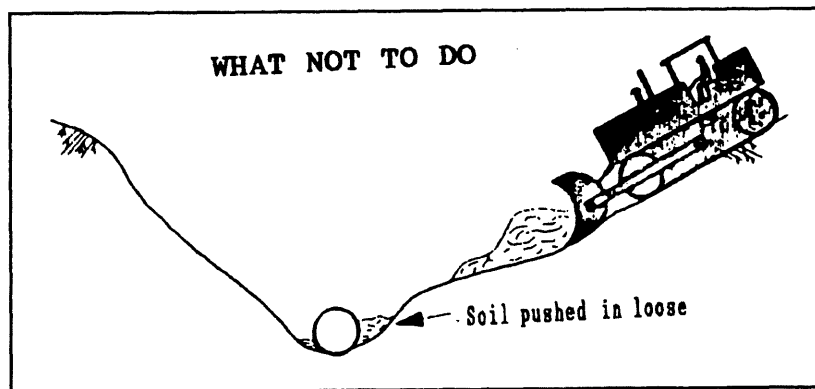
**Note:** Procedure is the same for a pipe installed in a cut or installed in an existing road except that no roadway embankment is placed first (eliminate Step 1).

## WHAT NOT TO DO



Step 1: Do not push pipe into ditch.

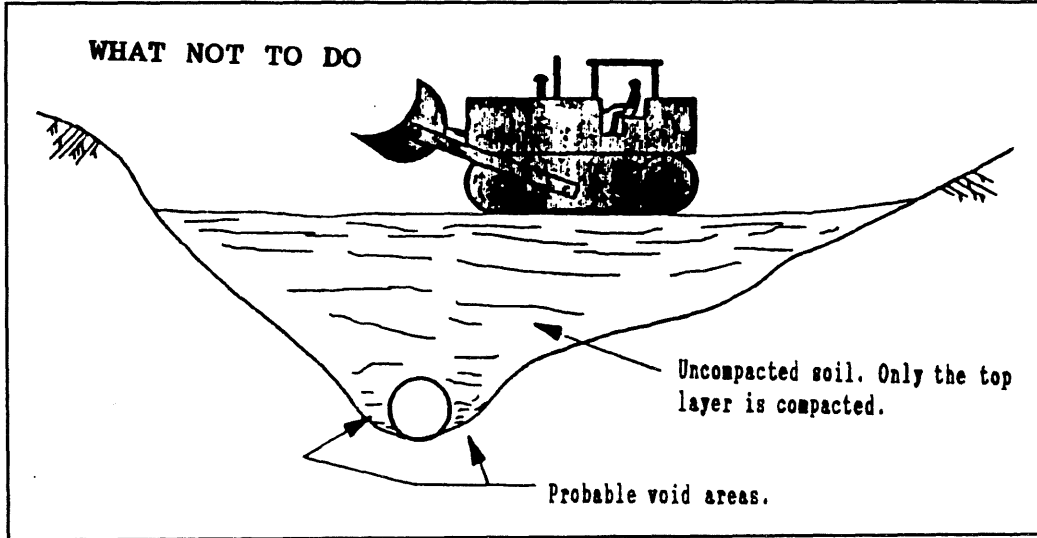
## WHAT NOT TO DO



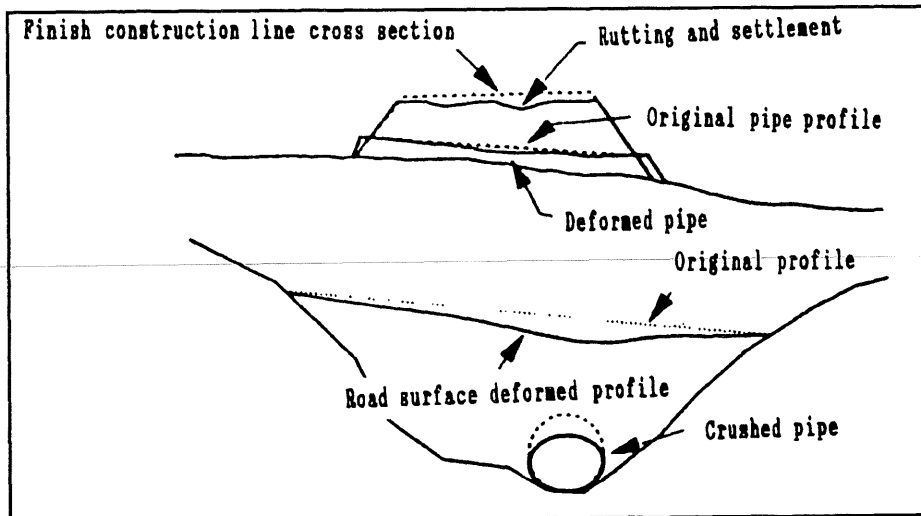
Step 2: Do not push ditch full of loose soil.

## STATE FOREST ROAD MANUAL

### WHAT HAPPENS WHEN ONE DOES THE "WHAT NOT TO DO'S"



Step 3: Do not try to compact soil with dozer, loader or truck.



Step 4: Traffic and weather caused settlement, rutting, deformed and crushed pipe.



CARTWAY LAW

**164.07 ESTABLISH, ALTER, OR VACATE**

A town board, when authorized by a vote of the electors at the annual meeting, or at a special meeting called for that purpose, may establish or vacate a town road by resolution, and may acquire the right-of-way as may be necessary for the road by gift, purchase or as provided in section 164.07. A town board may alter a town road by resolution.

**History:** 1959 c 500 art 5 s 6; 1984 c 562 s 8; 1985 c 169 s 5; 1 Sp 1985 c 16 art 2 s 10

**164.07 MS 1957** [Repealed, 1959 c 500 art 6 s 13]

**164.07 ESTABLISHMENT, ALTERATION, VACATION.**

Subdivision 1. **Petition.** Any town board may alter or vacate a town road or establish a new road in its town upon a petition of not less than eight voters of the town, who own real estate, or occupy real estate under the homestead or preemption laws or under contract with the state, within three miles of any proposed road to be established, altered or vacated; provided, that in any town not having eight voters who own real estate or occupy real estate under the homestead or preemption laws or under contract with the state, within three miles of any proposed road, the town board of such town may alter or vacate a town road, or establish a new road in the town upon a petition signed by a less number of voters of such town, who own real estate or occupy real estate under the homestead or preemption laws or under contract with the state, in such town. Such petition shall contain a description of the road, and what part thereof is to be altered or vacated, and, if a new road, the names of the owners of the land, if known, over which such road is to pass, its point of beginning, general course, and termination.

Subd. 2. **Hearing.** The petition shall be filed with the town clerk, who shall forth-with present it to the town board. The town board within 30 days thereafter shall make an order describing as nearly as practicable the road proposed to be established, altered, or vacated and the several tracts of land through which it passes, and fixing a time and place when and where it will meet an act upon the petition. The petitioners shall cause personal service of such order to be made upon each occupant of such land at least ten days before such meeting and cause ten days' posted notice thereof to be given. In addition, the petitioners shall serve notice of the order by certified mail upon the commissioner of natural resources at least 30 days before such meeting if the road to

## STATE FOREST ROAD MANUAL

be vacated terminates at or abuts upon any public water. The notice under this subdivision is for notification purposes only and does not create a right of intervention by the commissioner of natural resources.

**Subd. 3. Examination of proposed road.** At the time and place designated, the town board shall meet and, on proof by affidavit of the giving of such notice, it shall examine the road proposed to be established, altered, or vacated, hear all parties interested, and determine whether it will grant or refuse the petition. If it be refused, the fact shall be noted on the back thereof.

**Subd. 3a. Drainage facilities.** On consideration of a petition for vacation of a road, the town board shall determine whether the lateral ditches of said road are essential for surface drainage of adjacent lands, or for drainage of public highways, in the area. If the board finds that preservation of such drainage facilities is for the general health and welfare of the public, then the board may cause the road to be vacated with a provision that the township retain the right of access for the purpose of maintaining such drainage facilities. An owner of land adjacent to the vacated portion of the road shall not interfere with the functioning of such drainage facilities.

**Subd. 4. Survey.** If the petition be granted, the town board, if it deems it necessary, shall cause a survey to be made. When the center of such road does not follow a section line, or some subdivisional line of a section, the surveyor shall note the distance to the point on any course at which such course will intersect a section line, and the distance of such point of intersection from the most convenient section, quarter-section, or meander corner, as established by the government survey; and the notes of such intersections, and a description of the road so established, altered, or vacated shall be incorporated in an order to be signed by the town board.

**Subd. 5. Damages.** The damages sustained by reason of establishing, altering, or vacating any road may be ascertained by the agreement of the owners and the town board; and unless such agreement is made, or the owners release in writing all claims to damages, the same shall be assessed and awarded before such road is opened, worked, or used. Every agreement and release shall be filed with the town clerk and be final as to the matters therein contained. The town board shall assess the damages of each claimant with whom it cannot agree, or who is unknown, specifying the amount awarded to each and briefly describing each parcel of land. In ascertaining the damages which will be sustained by any owner the town board shall determine the money value of the benefits which the establishment, alteration, or vacation, as the case may be, will confer, and deduct the benefits, if any, from the damages, if any, and award the difference, if any as damages.

Subd. 6. **Filing of award notification.** The award of damages shall be filed with the town clerk. Within seven days after filing the town clerk shall notify, in writing, each known owner and occupant of each tract of the filing of the award of damages. The notification shall set forth the date of the award, the amount of the award and any terms or conditions of the award.

Subd. 7. **Appeal.** Within 40 days after the filing of the award of damages any owner or occupant may appeal from the award by filing a notice of appeal with the court administrator of the district court of the county where the lands lie. The notice of appeal shall be accompanied by a bond of not less than \$250, with sufficient surety approved by the judge or the county auditor conditioned to pay all costs arising from the appeal in case the award is sustained. A copy of the notice shall be mailed by registered or certified mail to the town clerk or any member of the town board. The notice of appeal shall specify the award or failure to award appealed from, the land to which it relates, the nature and amount of the claim of appellant, and the grounds of the appeal.

Subd. 8. **Trial.** The appeal shall be entered upon the calendar for trial at the next general term of the court occurring more than 20 days after the appeal is perfected. It shall be tried in the same manner as an appeal in eminent domain proceedings under chapter 117. The prevailing party shall recover costs and disbursements as in other civil cases and judgements shall be entered upon the verdict.

Subd. 9. **Payment.** If no appeal is taken within the appeal period, the award shall be considered the same as a judgment. The provisions of sections 365.41 and 365.42 shall apply as to payment of all awards and judgments; and such award or judgment shall draw interest at the rate of six percent per annum to date of payment. The duty of the town board to pay the award or final judgment shall be held and construed to be just compensation or the securing of just compensation within the meaning of the constitution.

Subd. 10. **Appeal not to delay prosecution of improvement.** After the award of damages has been filed, the board may proceed to open, construct, alter, or change the highway. An appeal from the award of damages shall not delay the prosecution of the proposed improvement, and the town board may proceed as if no appeal had been taken.

Subd. 11. **Order.** The order establishing, altering or vacating any road shall be recorded by the town clerk, and a copy thereof certified as true and correct by the town clerk shall be forthwith filed for record with the county recorder or registrar of titles of the county within which the land and premises

## STATE FOREST ROAD MANUAL

are located. The certified copy of the order shall be first presented to the county auditor who shall enter the same in the transfer records and note upon the certified copy over the auditor's official signature, the words "entered in the transfer record." The order or a certified copy shall be received in all courts as competent evidence of the facts therein contained and be prima facie evidence of the regularity of the proceedings prior to the making thereof except upon the hearing of an appeal.

Subd. 12. **Refusal to establish.** The determination of a town board refusing to establish, alter or vacate any road shall be final, unless appealed from, for one year from the filing of its order; and no petition for establishing, altering, or vacating such road shall be acted upon within that time. In case its determination granting a petition is appealed from and reversed, it shall not within one year from date of such determination entertain a petition having the same or a similar object.

**History:** 1959 c 500 art 5 s 8; 1967 c 723 s 1; 1973 c 24 s 1; 1976 c 181 s 2; 1986 c 444; 1Sp1986 c 3 art 1 s 82; 1989 c 183 s 3

**164.08 MS 1957** [Repealed, 1959 c 500 art 6 s 13]

### **164.08 CARTWAYS.**

Subdivision 1. **May be established in certain instances.** The town board by resolution may establish a cartway two rods wide and not more than one-half mile in length upon petition presented to the town board signed by at least five voters, freeholders of the town, requesting the cartway on a section line to serve a tract or tracts of land consisting of at least 150 acres of which at least 100 acres are tillable. If the petition is granted the proceedings of the town board shall be in accordance with section 164.07.

Subd. 2. **Shall be established in certain instances.** Upon petition presented to the town board by the owner of a tract of land containing at least five acres, who has no access thereto except over the lands of others, or whose access thereto is less than two rods in width, the town board by resolution shall establish a cartway at least two rods wide connecting the petitioner's land with a public road. In an unorganized territory, the board of county commissioners of the county in which the tract is located shall act as the town board. The proceedings of the town board shall be in accordance with section 164.07.

The amount of damages shall be paid by the petitioner to the town before such cartway is opened.

For the purposes of this subdivision damages shall mean the compensation, if any, awarded to the owner of the land upon which the cartway is established together with the cost of professional and other services which the town may incur in connection with the proceedings for the establishment of the cartway. The town board may by resolution require the petitioner to post a bond or other security acceptable to the board for the total estimated damages before the board takes action on the petition.

Town road or bridge funds shall not be expended unless the town board, or the county board acting as the town board in the case of a cartway established in an unorganized territory, by resolution determines that an expenditure is in the public interest. If no resolution is adopted to that effect, the grading or other construction work and the maintenance of the cartway is the responsibility of the petitioner, subject to the provisions of section 164.10. After the cartway has been constructed the town board, or the county board in the case of unorganized territory, may by resolution designate the cartway as a private driveway with the written consent of the affected landowner in which case from the effective date of the resolution no town road and bridge funds shall be expended for maintenance of the driveway; provided that the cartway shall not be vacated without following the vacation proceedings established under section 164.07.

**Subd. 3 Maintenance Costs** When a cartway is not maintained by a town, one or more of the private property owners who own land adjacent to a cartway or one or more of the private property owners who has no access to the owner's land except by way of the cartway may maintain the cartway. The cost of maintenance shall be equitably divided among all of the private property owners who own land adjacent to the cartway and all of the private property owners who have no access to their land except by way of the cartway. The following factors may be taken into consideration when determining an equitable share of maintenance expenses; the frequency of use, the type and weight of the vehicles or equipment, and the distance traveled on the cartway to the individual's property. The town board may determine the maintenance costs to be apportioned to each private property owner if the private property owners cannot agree on the division of the costs. The town board's decision may be appealed within 30 days to the county court of the county in which the cartway is located. Private property owners who pay the cost of maintenance shall have a civil cause of action against any of the private property owners who refuse to pay their share of the maintenance cost.

**History:** 1959 c 500 art 5 s 8; 1978 c 551 s 1; 1979 c 83 s 1; 1980 c 435 s 2; 1981 c 77 s 1; 1985 c 163 s 1; 1986 c 444; 1989 c 16 s 1, **164.09 MS 1957** [Repealed, 1959 c 500 art 6 s 13]

### **164.09 JOINT CARTWAYS.**

Subdivision 1. **Joint resolution.** The town boards of adjoining towns by joint resolution may establish a cartway commencing in one such town and terminating in another such town when the cartway will provide access to a tract or tracts of land of not less than five acres which have no access to a public road except over the lands of others.

Subd. 2. **Agreement.** The town boards, in behalf of their respective towns, may enter into agreements with each other providing for the equitable division of the costs and responsibilities to be borne by each for the right-of-way, construction, and maintenance of the cartway. The agreement may also provide for the letting of a joint construction contract covering all or part of the work to be performed on the cartway.

Subd. 3. **Procedure.** After entering into the agreement the town boards shall proceed in accordance with the agreement to construct and maintain the joint cartway.

**History:** 1959 c 500 art 5 s 9

**164.10** MS 1957 [Repealed, 1959 c 500 art 6 s 13]

### **164.10 EXPENDITURE OF FUNDS ON CARTWAYS.**

Any town board may expend town road and bridge funds upon a legally established cartway the same as on town roads if in the judgment of the board the public interests require it; provided, that where any town board has refused to allocate funds for the upkeep of a cartway, then, upon the petition of ten taxpayers of the town, the town board shall present for the approval of the voters, after due notice, at the annual town meeting the petition for allocation of funds, and at the town meeting the electors of the town shall allow or reject the petition. If the majority of those voting approve the petition for allocation of funds, the town board shall expend road and bridge funds on the cartway.

**History:** 1959 c 500 art 5 s 10

**164.11** MS 1957 [Repealed, 1959 c 500 ad 6 s 13]

### **164.11 LANDS DEDICATED AS ROADS OR STREETS; IMPROVEMENT.**

Land dedicated to public use as a street, road or cartway, if not less than 30 feet in width, shall be deemed a legal cartway.

**History:** 1959 c 500 art 5 s 11; 1984 c 562 s 9

**164.12 MS 1957 [Repealed, 1959 c 500 art 6 s 13]**

### **164.12 ROAD ON TOWN LINE.**

Subdivision 1. **Proposal to establish.** When adjoining towns propose to establish, alter, or vacate a road on or along the line between such towns they shall proceed as hereinafter provided.

Subd. 2. **Division of responsibilities.** The town boards shall divide the length of the road proposed to be established, altered, or vacated into two parts. When it is proposed to establish or alter a road, the division shall be made so as to divide as nearly equal as possible the cost of right-of-way, construction, and maintenance of the entire road. If the proposal is to vacate a road, the division shall be made so as to divide as nearly equal as possible any damages that may be occasioned thereby.

Subd. 3. **Agreement.** After the division the boards shall enter into an agreement specifying which part shall be vacated, or opened, constructed, and maintained by each. Thereafter, each board shall proceed in the manner and subject to the same review as provided in section 164.06 or section 164.07.

Subd. 4. **Joint contract.** When a town line road is established or altered as provided herein, the boards may jointly let a contract covering all or part of the work to be performed on the road. If a joint contract is not let each town board shall open and construct its portion thereof as expeditiously as possible.

Subd. 5. **Division of responsibilities if portion of road taken over by state or county.** If a portion of a town line road is taken over by the state as a trunk highway, or by a county as a county state-aid highway or county highway, the town boards concerned shall divide the portions of the town line road not taken over by the state or county, so that the cost of construction, reconstruction, and maintenance thereof will be apportioned as nearly equal as possible. After such division the boards shall enter into an agreement specifying which part shall be constructed and maintained by each.

Subd. 6. **Failure to agree.** When the town boards cannot agree upon a division as provided in subdivision 2 or subdivision 5, or upon the petition of either town board when a division previously agreed upon has proved to be inequitable, the county board, or when the road is on a county line the county boards of the counties concerned, shall determine the proper division of responsibility. In making such division the county board or boards shall follow the procedures provided for in subdivision 2 or 5. Where deemed necessary the services of the county engineer may be used.

**History:** 1959 c 500 art 5 s 12

**164.13 MS 1957 [Repealed, 1959 c 500 art 6 s 13]**

#### **164.13 EXPENSES OF CERTAIN TOWNSHIP LINE ROADS.**

Subdivision 1. **Bridges.** In all cases where a road other than a county road, a county state-aid highway or trunk highway is on the line between two towns, whether the towns are in the same county or not, it shall be the duty of the towns to bear jointly and in equal shares the expense of constructing and maintaining any bridge on the road as made necessary by the construction of a drainage ditch or by reason of the changing, widening or alteration of any drainage ditch, or by reason of the altering or changing of any watercourse.

Subd. 2. **Ditches.** In any proceeding for the establishment and construction of any drainage ditch or the changing, widening or alteration of any such ditch, or the altering of any watercourse, as specified in this section, each of the towns charged by the provisions of this section with the obligation of constructing and maintaining any bridge because of any such improvements, shall be awarded and paid one-half of the total damages awarded for the construction of the bridge by reason of the obligation to construct and maintain the bridge.

**History:** 1959 c 500 art 5 s 13

**164.14 MS 1957 [Repealed, 1959 c 500 art 6 s 13]**

#### **164.14 ROADS ON LINE BETWEEN TOWN AND ADJOINING CITY.**

Subdivision 1. **Proposal to establish.** When a town and an adjoining city propose to establish, alter, or vacate a road on or along the line between the town and the adjoining city, they may proceed



as hereinafter provided.

Subd. 2. **Agreements.** The town board and the governing body of the adjoining city may enter into agreements providing for the equitable division of the costs and responsibilities to be borne by each for the establishment, alteration, or vacation of the road. If the agreement provides for the establishment or alteration of such a road, the agreement may also provide for the letting of a joint construction contract covering all or part of the work to be performed on the road. The agreement may also provide for a division of the costs of subsequent improvement and maintenance of the road.

Subd. 3. **Joint resolution.** After entering into the agreement the town board and the governing body of the city, by joint resolution shall establish, alter, or vacate the road in accordance with the agreement. The town board shall proceed in the manner and subject to the same review as provided in section 164.06 or section 164.07, and the city shall proceed in the manner provided by law for the establishment, alteration, or vacation, as the case may be, of city streets.

Subd. 4. **Inequitable agreements.** If an agreement for the division, as provided in subdivision 2, has proved to be inequitable, either the town board or the governing body of the city may petition the county board, or where the road is on a county line, the county boards of the counties concerned, to resolve the matter, and the county board or boards shall determine the proper division of responsibility. Where deemed necessary, the services of the county engineer may be used.

**History:** 1959 c 500 art 5 s 14; 1973 c 123 art 5 s 7; 1984 c 562 s 10

## STATE FOREST ROAD MANUAL

### LEGAL STATUS OF ROADS

Questions about the legal status of forest roads arise frequently. The history of many of these roads is buried in 60 or more years of use and very sketchy and incomplete records. Each road must be considered on its own merits. The history of the development, use and ownership of the particular road is critical in determination of its legal status.

The 1988 Forest Road Act declared that all roads on the forest inventory at that time were legally adopted as Forest Roads. This is limited to the extent of the existing right-of-way or the limits of normal maintenance. It includes the backslopes and the cleared area which are considered necessary for the road. If one of these roads is to be reconstructed using this "prescriptive easement" all work must remain within this limited existing right-of-way.

If questions arise about the ownership of these roads it is necessary to develop a history of the road. The information which is helpful in making this determination is outlined on the following page. The AGO will need to have much of this information available to discuss legal issues for any particular road.

If this information is gathered for any road a copy of it should be sent to the Forest Road Specialist for inclusion in the road file. At a future date this material will be desirable for all roads in the Forest Road system but it is best captured in an electronic format (on a computer). The road history module for the GIS has not been proposed as of 1991.





**G. PLANS AND PROPOSALS**



# PROJECT PROPOSAL

Region I	Discipline Forestry	Date January 3, 1989	Project Number <b>4-89</b>
-------------	------------------------	-------------------------	-------------------------------

## I. PROJECT

Name of Project Frontier-Farmer Loop	Area, District, Park 132 - Birchdale Forestry	Federally Reimbursable? <input type="checkbox"/> Yes <input type="checkbox"/> No
Class of Land Con. Con.	Acres	Miles 3.6 new
		Estimated Total Cost \$ 37,222.00

Location: (See Map)  
sec. 3, 9, 10, 16 and 17 of 159-28

### Detailed Explanation of Project:

Utilize dozer, backhoe, and motor grader to construct 3.6 miles of forest road to connect the Frontier and Farmer Forest Roads. Gravel is stockpiled within 2 miles of project site. The Farmer Forest Road will receive a 6" gravel lift as part of this project. Entire route is on state land and no conflict exists with wolf management road density guidelines.

## II. FINANCING OF PROJECT

	1. COST *	2. COST **	TOTAL AMOUNTS
Salaries - Labor	\$	\$	\$
Salaries - Supervisor			
Equipment Rental with Operator	37,222.		37,222.
Equipment Rental or Lease			
Gas, Oil, Lubricants			
Materials and Supplies			
Repairs and Maintenance			
Development and Minor Construction			
Building and Construction Materials			
Other Equipment			
Other Costs (Specify)			
<b>TOTALS</b>	<b>\$ 37,222.</b>	<b>\$</b>	<b>\$37,222</b>

<b>1. PROJECT COST *</b>
AID
Seq. Number
Object Code
Project or Source Code

<b>2. PROJECT COST **</b>
AID
Seq. Number
Object Code
Project or Source Code

## III. FINAL COSTS

Labor \$	Equipment Rental \$ 37,222.00	Materials \$ included	Total Cost \$ 37,222.00
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## IV. PROPOSED DATES

Starting Date: September 1, 1989	Completion Date: October 1, 1990
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Signature of Person Submitting Proposal	Full Name (Print or Type) Tom Crumpton	Date: 12-30-88
Authorized Approval Signature 	Name & Title (Print or Type) David H. Thomas Ass't Area Forest Supervisor	Date 2-7-89
Authorized Approval Signature	Name & Title (Print or Type)	Date
Authorized Approval Signature	Name & Title (Print or Type)	Date

# V. COST ESTIMATE

## A. EQUIPMENT

TYPE SIZE	TYPE OF EQUIPMENT	NUMBER OF HOURS	RATE/HOUR	TOTAL
	Crawler dozer, backhoe, motor grader	3.6 miles	7200/mile.	\$ 25,920.00
	gravel truck and loader	4521 yds.	2.50/yd.	11,302.00

TOTALS \$ 37,222.00

## B. PERSONNEL

NUMBER	CLASSIFICATIONS	NUMBER OF HOURS	RATE/HOUR	TOTAL
	Equipment Operators			\$
	Truck Drivers			
	Carpenters			
	Laborers			
	Crew Forman			

TOTALS \$

## C. MATERIALS & SUPPLIES

Obj. C.C.	DESCRIPTION	TOTAL
	culverts included in machine rental rate	\$

TOTALS \$

# VI. EQUIPMENT, LABOR, SUPPLIES AND LOCATION

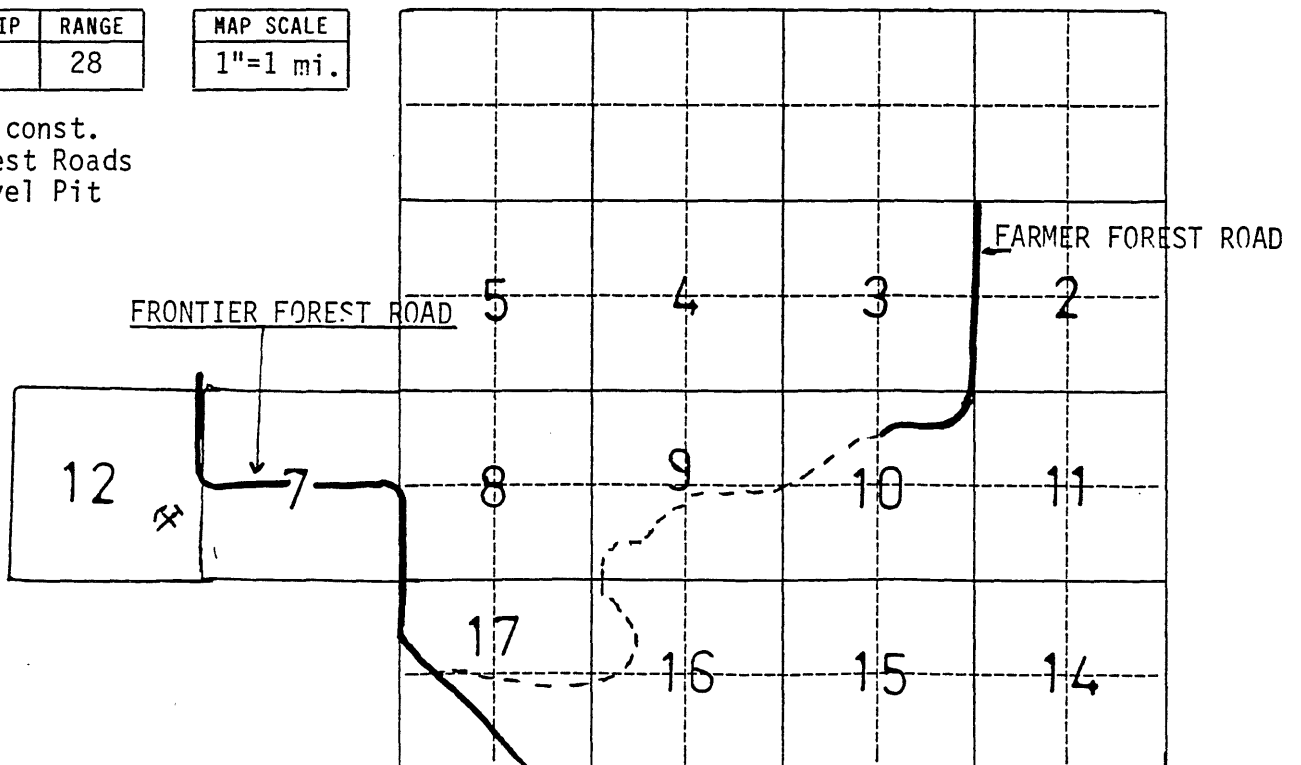
A. State equipment, supplies or labor to be used on Project:  
40 hrs. state supervisor - \$485.00

B. SHOW: 1.) Location of Project on grid below; 2.) Section, Township & Range; 3.) existing roads if adjacent to Project Area. Be sure to indicate scale.

SECTION	TOWNSHIP	RANGE
	159	28

MAP SCALE
1"=1 mi.

- New const.
- Forest Roads
- ⊗ Gravel Pit



## BUREAU OF ENGINEERING / FORESTRY ROLES

The Bureau of Engineering functions as an in house consultant to the Division of Forestry. They can provide broad administrative oversight and coordinate services, to investigate engineering problems, design projects or solutions, provide surveys, and write legal descriptions. They also assist the Division in setting safety standards. The Bureau may provide advice, assistance, designs, contracting services, inspections, plan review, transportation planning, or feasibility studies according to the priority list established in May, on a time available basis. The master specifications developed and maintained by them shall be used in their contracts and guide Division of Forestry contracts.

When requisitioned, according to Operational Order #28, the Bureau shall prepare plans with input from Forestry staff. Concept plans developed early in the project may lead to a better understanding of the scope of work expected. Plan review will be guided by Operational Order #37. Preliminary plans with specifications will receive a full review on the ground by all parties involved. Final review shall be completed before the plans are signed and printed for publication. When plans are ready for bid they will be sent to the Regional Business Manager for distribution, with copies sent to St. Paul, Region and Area offices.

The Division of Forestry shall consider the services available from the Bureau in their project planning, recognizing the strengths and availability of other sources of information to meet their needs. They shall involve the Bureau where public safety is affected by proposed projects. All bridge work will be approved by the Bureau before work begins. Forestry may help the Bureau with field work or contract administration at the Bureau's request, on a time available basis. Forestry personnel shall be responsible for locating the proposed centerline before the engineering staff begins project design.

All Bureau services will be requested with the "Engineering Requisition Form NA-00077-02" following Operational Order 28. The only exception is advice given over the telephone or projects requiring less than eight hours work. Requisitions must be listed on the Engineering Priority List which is sent to the Bureau of Engineering in May.

Forestry may use the engineering services and testing firms listed on the state "M" contracts without going through the Bureau directly. We will ask the Bureau for recommendations or will advise the Bureau in writing when using "M" contracts. All road projects require design review according to Operational Order 37. The specifications shall be considered part of this review process. No plans will be signed for printing until the specifications have received a preliminary review. The Regional



Engineer shall review all Forestry plans bid through the regional business office. Ten days shall be provided for this review before plans are copied and advertised. Efforts shall be made to incorporate review suggestions into the project design. Explanations may be necessary to provide an understanding of the background for changes. When disputes on plan changes cannot be resolved at the region level, they shall be referred to the St. Paul road staff and the Assistant Bureau Administrator.

# BUREAU OF ENGINEERING Requisition for Services



SERVING YOUR DNR  
Landscape Architecture  
Recreational Mapping  
Architectural  
Engineering  
Surveying  
NEEDS

Since 1958

Requisition No.  
FO-93-09

Sponsor  
DNR - Forestry

Administrative Unit		Unit No.	Date Received by Engineering
Sub Unit			
Lake ID#	Field Service ID#	MNDOT Bridge ID#	
Region 3	Sec., Twp., Rge.		
County Mille Lacs	23 39N 26W		
Funding Source	Development Cost \$		
			Data Entry <u>                    </u>

Contact Person  
Robert Nelson

Phone No.  
(612) 689-2832

## SERVICES REQUESTED

Engineer/design a high quality Class 5 Road with turnouts and parking lot for hunter access. Road length estimated at .9 miles Access is from Mille Lacs County Road 24. Land was donated by Deer Hunters Association and Ruffed Grouse Society. Survey (land) has been completed. Wetland issues must be addressed. Road completion date - 9/1/93

Initiated by:	Date
Approved by: (Regional or Unit Supervisor)	Date
Approved by: (Director or Administrator)	Date
Approved by: (Assistant Commissioner of Administration)	Date
Bureau of Real Estate Management (Acquisition Only)	Date


File No. \_\_\_\_\_

## ANNUAL ROAD WORK PLANNING

Road work planning is an annual process to outline road system needs that are identified in the Field Station transportation plan or are caused by traffic and weather conditions. The annual work plan for forest roads needs to be flexible to accommodate unforeseen conditions which may arise throughout the year.

Maintenance standards for each road should be defined in the Field Station's transportation plan. These standards should be used to develop the annual work plan and be based on existing conditions and predicted traffic use. Field conditions should be monitored to determine what adjustments are needed to reach every road's maintenance level. Field Station employees should assess road conditions in their normal course of work and notify the appropriate staff person of any road problems. Conditions needing attention can then be detected early enough to avoid major repairs. Maintenance procedures and inspection/reporting forms are included in the maintenance section of this manual.

Major projects may take two or more years before the road is ready for use. The transportation plan defines the general road location. The annual work plan needs to estimate the cost, time and effort needed to develop and complete the project. Project planning should start with a project proposal and discussion of the project with other agencies and adjacent owners (the annual road meeting is a good forum for this). Road alignment should be planned to minimize miles of road needed to serve all ownerships, to the fullest extent possible.

The most critical part of road design is field location of the road alignment. This will determine cost of construction, difficulty of maintenance, and safety needs. Division staff are the most critical link to locating a good alignment because they know the terrain and can relate the road location to maps and aerial photography. When federal land is involved, assistance with alignment may be provided by USFS foresters or engineers. Proper alignment may take several trials to establish. Two or three colors of flagging should be used when working on the alignment, so different alternatives can be considered without confusion. Design of some logger constructed roads will be left to the logger at this stage without further engineering.

Projects requiring Bureau of Engineering (BOE) assistance or contract engineering assistance (which BOE can coordinate) require that an Engineering Requisition be filled out and sent to the St. Paul Road staff. The Division will number, sign and prioritize the requisitions and submit them to BOE. Unless the requisition has a number assigned by St. Paul and it is listed on the Division's priority list, BOE will

not act on it.

The only exceptions are short projects that require less than 8 hours of field and office work. In these situations BOE may elect to help using a general engineering services requisition on a time available basis. This general requisition is sent in annually by the St. Paul office. The requisition process is explained in Operational Order 37. The purpose of the requisition is to define the scope of the project, so copies of the project proposal and any maps should be attached. Providing good information will help BOE furnish the services that we need in a timely manner.

The BOE road design will be based on the location chosen by the field staff. Final design and measurement of the alignment should be done by field staff and the designer and field notes should be kept. The designer may be a Field staff person, the Regional Road Specialist or Bureau of Engineering staff. Field staff should be involved in the preliminary design. They can provide information to the designer and ask questions to guide the road design. It is the responsibility of the field forester to understand how and why the final design differs from the original need. A full year should be allowed for layout and design.

During construction, Field staff should be on the site daily for Division administered projects or a minimum of three days per week for BOE projects. When the construction phase is complete, the road should be allowed to set for a full year without use where feasible. An alternative is to use the road during the winter season of the first year with care being taken to protect the surfacing and prevent spring rutting.

A road project can be completed a minimum of two years from the start of planning. Timelines and costs can greatly increase if easements are needed or construction problems occur.

Each Field Station should consider these items when completing their annual work plan.

## AREA TRANSPORTATION PLANNING ROAD INFORMATION NEEDS

### INTRODUCTION

The Division of Forestry is required by state law (MS. 89.002) to develop and maintain a forest road system that provides access, permits management, protection, and development of state forest resources. Despite the law, we need a functional road system to manage resources, provide services, and simply to get where we want to go. The Division can continue to provide this road system by:

- Maintaining an up-to-date state forest road inventory
- Providing adequate maintenance of existing roads
- Reconstructing state forest roads to handle current and anticipated traffic levels and types
- Constructing new roads to provide access to state forest land for resource management or recreation purposes
- Establishing legal right-of-ways to state land

Transportation planning can help Field Stations achieve these objectives by laying out and prioritizing road needs. These needs can be based on proposed land ownership patterns, management activities and projected traffic levels. The following paragraphs outline the basic information needed for a transportation plan.

### EXISTING ROAD INVENTORY

An accurate and complete road inventory is needed to develop a road plan. Most Field Stations have a good inventory of class 1 - 4 roads. Special attention should be given to class 5 and 6 roads we use or plan to use in the future.

The 1982 Forest Road Plan recommends computerizing the forest road inventory. This was partially accomplished during digitizing Phase II (CSA) inventory of state and county land. Road information from Phase II is based on USGS 1:100,000 maps, and does not specifically identify forest roads or classes. Completing the road inventory for an Field Station's network requires several things:

## STATE FOREST ROAD MANUAL

1. Digitizing road information on maps from the 1991 road numbering project. These contain most class five and six roads and are color coded by road class. All forest roads on these maps have been numbered according to the 1988 circular letter on numbering.
2. All access on the new Phase II inventory maps should be checked by Field Station personnel. Access is any route the Division uses for its activities. This includes class 1-6 roads plus any federal, county, private, or Wildlife Management Area roads (state or federal), used for Division activities. Even trails should be considered part of the road network (class 5 or 6) if they are used by the Division.

When adding access to Phase II maps and GIS, USGS quads should be used as base maps. Use road classification symbols adopted by the Division (see attachment). Eventually this information will be entered on GIS by the MIS section in St. Paul. However, they do not have the time to enter large amounts of road data. The Land Management Information Center (LIMIC) has digitized and produced maps for the Blackduck Area on a pilot basis. Other work may be done by them or done in cooperation with other DNR Divisions, MnDOT, and contractors. Until the staff time or funds are available, most of this information will be kept at the Field Station offices.

3. Having the location and class of roads on Phase II maps provides a good information base. Operational road plans must go further and produce maintenance and development schedules for individual state forest roads (class 1 - 6).

### TRANSPORTATION PLANS

State forest roads are defined as roads the Division of Forestry:

1. Is responsible for maintaining
2. Owns
3. Has a legal right-of-way
4. Has a cooperative maintenance agreement with the owner

### Maintenance scheduling

Maintenance is the most important activity to retain a usable forest road system. Original road condition, traffic, and expected weather must be considered. The transportation plan should be developed based on normal levels of maintenance unless a heavy volume of traffic is expected.

## Resurfacing

As a rule of thumb, the Division should resurface their roads on a 15 year schedule. This will provide adequate material for maintenance, protection of the subgrade, and user safety. Resurfacing is the most cost effective means of protecting road investments. A delay of one year will increase costs and could damage the subgrade. Damage from lack of adequate surfacing results in early and costly reconstruction. A five year delay could potentially require reconstruction costing more than double the amount needed for resurfacing.

## Reconstruction planning

Reconstruction is necessary for the road system to remain in a usable condition over the long term. If maintenance and resurfacing are done properly, the interval between reconstruction periods can be about 30 years. If reconstruction funding is not available, the subgrade may be damaged resulting in costs that will be twice the original estimates. Delaying one or two years is usually not critical, but five years may have a substantial impact.

## Planning information

The following information needs to be developed for each inventoried road (class 1 - 5), and class 6 networks. Some class 6 roads may warrant individual records, like long winter roads that are frequently opened:

- a. Purpose of the Road (primary use): (recreation, timber management, fire control, wildlife)
- b. Maintenance Needs (Scheduling):  
Construction Needs (Scheduling):  
Reconstruction Needs (Scheduling):

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Other Needs: (culverts, gates, parking, etc.)

These needs are based on estimates of type and amount of traffic anticipated in the ten year planning period, and the road class.

Scheduling of maintenance, construction, and reconstruction is necessary to ensure that roads are kept in operable condition and to incorporate projects into budgets and work plans.

- c. Preferred Management Strategy: (seasonal closures, access limitations, open for public use, multiple-use coordination, etc.)

This can be developed for each individual road segment or, a larger network, if management of the smaller segments is similar. The Division's road staff in St. Paul and other affected parties will discuss road management during the planning process, but Field Stations should initiate a preferred management strategy prior to this.

Use copies of the attached Transportation Planning Form for recording information to be added to the inventory. Assemble copies of the Field Station's newest Forest Road Inventory cards (1982 & 1989 yellow, 8.5 X 11.) The 1991 inventory has not yet been adapted for roads already on the road inventory. Forest Road Inventory cards contain most of the information needed for Field Station planning. Exceptions may be estimates of traffic by type and amount, and management strategies.

Structural inventory (proposed 1991) will provide planning information for system replacement and upgrading. It will also aid in guiding maintenance activities. This will improve cost estimates for short term projects and long term budgeting.

### ROAD DEVELOPMENT PROJECT PROPOSALS

The following information is needed for each proposed road development project in the Field Station's area (use copies of attached form to supplement the information on the Project Proposal NA-050-02). This information will be used to:

1. Set Field Station and statewide project priorities



2. Document project need and rationale.
3. Establish a basis for funding requests.
4. Coordinate road activities with other users and landowners.
5. Program/Field Station work planning and scheduling for the ten year period.

Name of Project:

Location:

Purpose (primary use): (i.e. to upgrade, reconstruct existing road, new road, for timber, recreation, etc.)

Description of Project: Describe and quantify miles of construction (class), reconstruction (class), resurfacing, etc.

Rough cost estimates for Project: considering terrain, surface material and condition, timber, class designation, parking areas, culverts, etc.

Acres accessed: by ownership, and, for state land, by class

Estimated Acres, Volume, and Value of State Commercial Timber accessed: broken down by cover type. This is quite easy to do with Phase II inventory on PC-File.

Estimate of Management Activities for next 10 year Period Based on TMPIS, if available: This is done by manipulating TMPIS results and summarizing for the area accessed.

- Harvest (by cover type) by method (clear cut, partial cut, etc.)
- Salvage
- Regeneration (artificial)
- TSI
- Other use (i.e. recreation, I&D, inventory, enforcement)

Easements required: (owner, location, miles, purpose)

Establish maintenance agreements: Owner, location, miles, purpose.

## STATE FOREST ROAD MANUAL

Enter location of the proposed project on a 4 inch/mile map (Phase II inventory map or equivalent.) Or the Field Station base map from the Planning Section or equivalent. For Field Station Transportation Planning only an approximate project layout is necessary. Also, show location of the existing road system in the project area with present ownership. Be sure to differentiate existing roads from proposed development projects. Show where different development actions begin and end (construction, reconstruction, resurfacing, etc.), the locations of bridges, and the ownership of land affected by the proposed road development.

### OUTLINE OF END PRODUCT

Assembling this information will result in the following for each Field Station:

1. A complete road inventory ready to be entered into the GIS and the Phase II maps (with documentation for state forest roads).
2. A schedule of maintenance needs for the entire state forest road system (classes 1-6).
3. A prioritized list of road project proposals with justifications and approximate cost estimates for:
  - a. New construction
  - b. Reconstruction
4. A prioritized list of easements required access to state-owned land.

**TRANSPORTATION PLANNING FORM**

RFS:

County:

Road Name:

Class:

Mileage:

Purpose:

Traffic Estimates: (type and amount)

Maintenance Needs (Scheduling):

Construction Needs (Scheduling):

Other Needs: (culverts, gates, parking, etc.)

Management Strategy:

**FIELD STATION PLANNING ROAD DEVELOPMENT PROJECT PROPOSAL**

Region, Field Station:

County:

Name of Project:

Location:

Purpose (primary uses):

Description of Project:

Rough cost estimates for Project:

Acres accessed:

Estimated Acres, Volume, and Value of State Commercial Timber accessed:

---

Estimate of Management Activities for next 10 year Period Based on TMPIS if available:

Easements required:

Maintenance agreements needed:

### The Field Station Transportation Plan

- A. - The program description and assessment include a restatement of the program goal, Field Station specific program accomplishments, a description of the existing road system, and a discussion of changes needed to meet expected traffic levels and resource management needs.
- B. - Program direction includes the strategy or description of what is to be done for each Field Station. All applicable policies and manuals are referenced and any exceptions noted. Field guidelines and a summary of proposed maintenance, reconstruction, and construction activities are listed. Include a table listing road projects by priority with cost estimates. Reference the roads' appendix.
- C. -The plan should address resources served by the transportation system during the length of the plan. This should include timber harvesting schedules, recreational needs, fish and wildlife access needs, and habitat management activities.
- D. -All projects and maintenance necessary to accomplish these goals and their costs.
- E. - The transportation plan should list all of the class 1 to 5 roads by class and mileage (available from computer printout of 1991 inventory when completed), and class 6 mileage as a total for the class. After the mapped inventory is entered into GIS, it is anticipated that a GIS generated mileage for class 6 roads could be computer-generated.
- E. - Staffing and objectives table.









**H. BUDGETS**

# STATE FOREST ROAD MANUAL

FY 93 (7/92 - 6/93) FOREST ROADS WORK PLAN

REGION: \_\_\_\_\_ FIELD STATION: \_\_\_\_\_

Filled Out By: \_\_\_\_\_ DATE: \_\_\_\_\_

Need not be typed.

ACTIVITY	AMOUNT	COST
----------	--------	------

**1. MAINTENANCE** (NOTE: All miles are total miles. Example: If a road is 10 miles long and is graded 3 times, miles = 30)

A. GRADING:	_____ MILES	\$ _____ COST
B. GRAVELING:	_____ MILES	\$ _____ COST
C. ROW MOWING:	_____ MILES	\$ _____ COST
D. ROW HERBICIDE:	_____ MILES	\$ _____ COST
E. ROW MECHANICAL BRUSHING:	_____ MILES	\$ _____ COST
F. ROW HAND BRUSHING:	_____ MILES	\$ _____ COST
G. BRIDGES, MINOR REPAIRS	_____ NUMBER	\$ _____ COST
H. CULVERTS, REPLACE	_____ NUMBER	\$ _____ COST
I. SIGNS, NEEDED	_____ NUMBER	\$ _____ COST
J. GATES, NEEDED	_____ NUMBER	\$ _____ COST
K. SNOW PLOWING	_____ MILES	\$ _____ COST
L. OTHER _____	_____	\$ _____ COST
M. _____	_____	\$ _____ COST

TOTAL MAINTENANCE COST..... \$ \_\_\_\_\_

**2. RECONSTRUCTION, CONSTRUCTION, BRIDGES, RESURFACING** (NOTE: There will only be money for new development projects if the DNR capital budget request is funded. Projects plans should still be noted here, however.)

DESCRIBE INDIVIDUAL PROJECTS AS FOLLOWS IN SHORT NARRATIVE. INCLUDE:

- A. PROJECT TYPE:
- B. PROJECT NAME:
- C. RFS:
- D. SHORT NARRATIVE DESCRIPTION INCLUDING COST ESTIMATE:
- E. DO YOU PROPOSE THIS AS A RIM FUNDED PROJECT?

(USE ADDITIONAL SHEETS AS NECESSARY)

**GENERAL:** The attached Division Direction and Priorities for FY 93 was approved by the DMT on 2/4/92. The following gives more specific direction for the state land development and road programs. Regions are encouraged to develop more specific FY 93 direction statements for their regional programs.

FY 93 work plans should reflect the needs of the resources we are managing. Field staff should use good judgement in prescribing the most cost effective practices, but the real needs of the resource must be planned for. Funding of the work plan will be done when we know what our FY 93 budget will be. Funding priorities will be developed with input from the regions at that time.

**MAJOR ISSUES:**

**FOREST ROADS**

The major issues facing the forest road program in FY 93 are

- A.) maintaining the existing forest road system with a very restricted budget,
- B.) protecting the road system from deterioration while maintaining access to state forests, and
- C.) assuring the safety of our forest road users. Existing levels of timber harvesting and recreational use are going to demand innovative approaches to maintaining and protecting the road system. Road construction and reconstruction will not be possible unless the Department's capital budget request is funded.

**FY 93 PROGRAM DIRECTION:**

FOREST ROADS

- \* No road construction or reconstruction will be done unless the Department's capital budget request is funded.
- \* Road maintenance is critical to protecting the large investment we have in our forest road system. Do not let roads needlessly deteriorate. Consider closing a road that you are not able to maintain during conditions in which the road could be subject to damage from traffic.
- \* Do what is necessary to protect the safety of our forest road users.





Minnesota Department of Natural Resources  
Division of Forestry

# STATE FOREST ROAD MANUAL

## I. REPORTS AND RECORDS

## TRAFFIC COUNTERS

A sizable portion of our maintenance budget (90+% in 1992) depends on this program. It began in 1988 with the Forest Road Act. The theory of the sample is like cruising, where a statistical sample is taken. We are just developing the base data or volume table, which requires good base sample records.

Presently, the effort is concentrated on 22 permanent sample counters. This will continue until December 30, 1993 when base curves can be established for the five types of roads. These curves will show average weekly traffic (using some interpolation) on each type:

1. Recreation
2. Through
3. Class 5
4. Other
5. Southeast.

By comparing these base values with average total traffic on the permanent sample roads, a weekly percentage of annual traffic can be developed for each classification. Then short term counts can be taken randomly, and converted to full year traffic figures using the weekly percentage for that type of forest road use.

When another total traffic count is needed, (suggested for 1993, 1998 . . . ), both permanent and short term counters will be used for the full year. Permanent counters should be used to adjust the averages determined by our initial study period.

### Short Term Counter Locations

Statistically, each road use category needs 50 - 75 counter readings of at least one week duration. To determine the sample locations list the roads by use class, omitting class six. Mileage between sample points is obtained by dividing total mileage of each use class by the number of samples wanted. Start randomly along the list and treat the mileage like it was one connected road. Find the location for the short term counters and distribute them to the field. Only one counter should be used on a road at a time, except where a permanent one is operating. Records show that about 14% of our counters will not give an accurate count and their data must be deleted from the study. So over sampling is needed to provide sufficiently reliable data.



Recording logging activity during the counting period is particularly important, as this will establish traffic volume from each type of vehicle.

## Counter Maintenance

Batteries

Loops

Hose

Moisture

Repairs

ACT Electronics  
6595 Edenvale Blvd.  
Suite 130  
Eden Prairie, MN 55346

Mike Olsen  
612-949-2079

Send counters directly to ACT and bill to the Central Office. Have ACT return them directly to the field station.

Forms

MN/DoT form (2914 (5-77)) should be used to record the data generated by this study.

Traffic Counters

The Division is using several types of traffic counters:

1. Pneumatic tube counters with a mechanical air switch. These are the oldest type. When the mechanical valve wears out they should be converted to the electronic air switch. Conversion of these counters is about 50% of the cost of buying a new style counter.

2. Pneumatic tube counters with an electronic air switch. These are the most reliable counters for our short term counting locations. Moisture can be a problem if the daily temperature swing is considerable. They are most reliable if placed in the shade and six inches or more off the ground.
3. Inductive loop counters are used for most of the permanent sampling locations. These use a loop of wire buried in the road and are excellent for year around use at some locations. Moisture can be a problem if the daily temperature swing is considerable. They are most reliable if placed in the shade and six inches or more off the ground.
4. Recording inductive loop counters are used for selected locations where traffic patterns are a concern. They use a loop of wire buried in the road and a paper tape for recording the time of vehicle use. They are excellent for year around use at some locations. There is interest in using them for enforcement purposes, since time patterns or time of entry can be determined. Moisture can be a problem if the daily temperature swing is considerable. These are most reliable if placed in the shade and six or more inches off the ground.
5. Infra-red counters have proven useful on a limited basis, but can miscount if branches or animals break the light beam. They are easily set up and the battery boxes may be buried for extended life in cold weather.

#### Installation instructions.

---

1. Pneumatic tubes should be placed inside sections of old fire hose. Both ends of the tube must be securely fastened to the road, usually with a long (12") spike. On long tubes it may be desirable to stake the hose at the center of the road.
2. Loops for induction counters should be installed in accordance with the manufacturers instructions.

Bureau of Policy and Planning

TRAFFIC DENSITY STATION REPORT

County Koochiching  
District Big Falls Cycles \_\_\_\_\_

Station 7-4-Toomey  
Recorder \_\_\_\_\_

I. Route Toomey Date Removed 9-8-93 Hour 12:00 a.m. Reading 9378  
 Direction from Station \_\_\_\_\_ Date Set 9-1-93 Hour 2:00 p.m. Reading 9333  
 Machine Number 43142 Total Hours 167 Total Traffic 45  
 Machine Type Tube 24 Hr. Traffic \_\_\_\_\_  
 Factor \_\_\_\_\_  
 A.D.T. \_\_\_\_\_  
 Previous Year \_\_\_\_\_

Remarks: \_\_\_\_\_

II. Route Toomey Date Removed 9-14-93 Hour 10:00 a.m. Reading 9400  
 Direction from Station \_\_\_\_\_ Date Set 9-8-93 Hour 12:00 p.m. Reading 9378  
 Machine Number \_\_\_\_\_ Total Hours 141 Total Traffic 22  
 Machine Type \_\_\_\_\_ 24 Hr. Traffic \_\_\_\_\_  
 Factor \_\_\_\_\_  
 A.D.T. \_\_\_\_\_  
 Previous Year \_\_\_\_\_

Remarks: \_\_\_\_\_

III. Route Toomey Date Removed 9-22-93 Hour 2:00 a.m. Reading 9474  
 Direction from Station \_\_\_\_\_ Date Set 9-14-93 Hour 10:00 p.m. Reading 9400  
 Machine Number \_\_\_\_\_ Total Hours 196 Total Traffic 74  
 Machine Type \_\_\_\_\_ 24 Hr. Traffic \_\_\_\_\_  
 Factor \_\_\_\_\_  
 A.D.T. \_\_\_\_\_  
 Previous Year \_\_\_\_\_

Remarks: \_\_\_\_\_

IV. Route Toomey Date Removed 9-29-93 Hour 2:00 a.m. Reading 9606  
 Direction from Station \_\_\_\_\_ Date Set 9-22-93 Hour 2:00 p.m. Reading 9474  
 Machine Number \_\_\_\_\_ Total Hours 168 Total Traffic 132  
 Machine Type \_\_\_\_\_ 24-Hr. Traffic \_\_\_\_\_  
 Factor \_\_\_\_\_  
 A.D.T. \_\_\_\_\_  
 Previous Year \_\_\_\_\_

Remarks: \_\_\_\_\_

V. Route \_\_\_\_\_ Date Removed \_\_\_\_\_ Hour \_\_\_\_\_ a.m. Reading \_\_\_\_\_  
 Direction from Station \_\_\_\_\_ Date Set \_\_\_\_\_ Hour \_\_\_\_\_ a.m. Reading \_\_\_\_\_  
 Machine Number \_\_\_\_\_ Total Hours \_\_\_\_\_ Total Traffic \_\_\_\_\_  
 Machine Type \_\_\_\_\_ 24-Hr. Traffic \_\_\_\_\_  
 Factor \_\_\_\_\_  
 A.D.T. \_\_\_\_\_  
 Previous Year \_\_\_\_\_

Remarks: \_\_\_\_\_

Weather and Road Conditions: \_\_\_\_\_

## STATE FOREST ROAD MANUAL

### REPORTS & RECORDS FOR FOREST ROAD PROGRAM

The reports and records are found throughout this manual in sections relating to the activity. The following table lists existing and proposed forms and their present status and location.

NUMBER\NAME	DATE	PURPOSE	MANUAL LOCATION	STATUS
BUDGET PLAN	1991	FOR AREA/REGION/PROGRAM PLANNING OF ANNUAL ROAD WORK	BUDGET	NEW 1991
ACCOMPLISHMENT REPORT	1991	FOR AREA/REGION ROAD ACCOMPLISHMENT REPORTING - USE THE SAME FORM AS BUDGET	BUDGET	PROPOSED 1991
MAINTENANCE & INSPECTION	1990	FOR MAINTENANCE OR INSPECTION OF ROADS	MAINTENANCE	REGION 1 1990
INVENTORY FORM (YELLOW)	1982/1988	EXISTING INVENTORY OF FOREST ROADS	INVENTORY	UNDER REVISION
INVENTORY (WHITE)	1991	NEW FOREST ROAD INVENTORY	INVENTORY	PROPOSED 1991
ROAD HISTORY	1983	BACKGROUND FOR FOREST ROAD HISTORY	LEGAL	NEEDS FORM CREATED
REPORT OF INCIDENT		FOR REPORTING ACCIDENTS OR POTENTIAL CLAIMS AGAINST STATE		OK
ROAD PROJECT COMPLETION - USE COPY OF BID SHEET WITH ROAD INFORMATION ADDED	1991	TO REPORT WORK AND COST OF ROAD PROJECT WORK.	SPECIFICATIONS	NEWLY PROPOSED TO REPLACE F-67
REGIONAL SUMMARY REPORT	1987	TO TRACK MONTHLY STATUS OF PROJECTS AND BUDGETS	GEORGE MILLER'S COMPUTER	PROPOSED
TOWNSHIP\COUNTY ROAD WORK PERMIT (F 243) (NA-271-02)	1991	TO PERMIT DNR TO WORK ON COUNTY OR TOWN ROADS. NOT FOR COOP AGREEMENTS	LEGAL	UNDER DEPT REVIEW
BRIDGE REPORT	MNDOT	OFFICIAL RECORD OF BRIDGES WITH CONDITIONS AND RATINGS	REPORTS & RECORDS	IN USE
DEVELOPMENT RECORD (F 67) NA-2093-01	1987	PROJECT ACCOMPLISHMENT REPORT	REPORTS & RECORDS	NEEDS REPLACEMENT

Maintenance records are kept at the Area office and summarized annually. Dates and details of work performed should be kept for seven years. After this, only a record of annual expenditures is needed. Easements are filed with the county recorder/auditor and the Bureau of Real Estate Management. A copy is sent to St. Paul for inclusion in the master road file.

Road agreements are filed with the parties to the agreements and a copy sent to St. Paul for inclusion in the master road file.

## BRIDGE REPORTS

Federal and state law requires each "bridge" in the state to have an inventory sheet filed at the St. Paul MNDOT office. A "bridge" is any structure with a span of 10 feet or greater. This includes multiple culverts having a total width greater than ten feet, and the distance between adjacent culverts is less than one culvert diameter. It applies whether the culverts are 18" or 108" in diameter. Any pair of 42" or any three 24" culverts meets this criterion.

The initial report information on location and type of structure is filled out by the Area roads staff. This information needs an engineer's "bridge rating" of the structure. Once rated, the form is sent to the Bridge Records Section of MNDOT, John Ireland Blvd., St. Paul, MN 55155. Bridge reports are sent to the BOE annually and may be obtained from them.

Federal law requires a biannual inspection, and state policy mandates an annual inspection. A rating is different from an inspection. This inspection is done by a county, MNDOT, or BOE engineer. It is also filed with the Bridge Records Section of MNDOT.









Minnesota Department of Natural Resources  
Division of Forestry

# STATE FOREST ROAD MANUAL

## J. ROAD DESIGN

## STATE FOREST ROAD MANUAL

### ROAD DESIGN

Initial forest road design is the key factor in determining long term cost and use. Design starts with planning and should consider road construction details and maintenance needs. The Department has adopted the BEST MANAGEMENT PRACTICES as minimum standards for all roads on state lands. These are contained in the BMP handbook and are not covered here. The BMP Handbook also provides excellent design guidelines for forest roads. Location is a primary concern in controlling road cost and safety. Durability of the road depends upon its location, the strength of construction materials and their placement in the roadway. Drainage and compaction are very important factors for durability and maintenance, using any given material.

The most important part of road design is field location of the alignment. Roads should be located and designed to provide the required service at the lowest construction and maintenance costs. The expenditure for surfacing and subsequent replacement of material should depend on the amount and kind of use of the road and the soils that compose the sub-grade of the roadbed. Roads located on flat terrain and on suitable soil types withstand greater use with less maintenance. Deep cuts, sharp curves, and extensive fills greatly increase construction and maintenance costs. Much can be saved in maintenance costs by matching the road design to the terrain. This will determine construction cost, maintenance difficulty, and safety. Division staff is the most critical link to this process because they know the terrain and can relate field position to maps and aerial photography. The forester should have a comprehensive knowledge of the natural features and use of the area served by the proposed road. All roads built on state land must be located and approved by DNR personnel. The initial centerline should be located by the Field Forester with assistance from the Area, Region, St. Paul or other road specialists. Where federal lands are involved, it may be possible to get assistance from USFS foresters or engineers to establish this location. The proper alignment may take several trials to establish. It is recommended to carry two or three colors of flagging when working on the alignment, so different alternatives can be considered with less confusion. Once located it must be approved by the Area roads specialist before further plan development. This includes roads constructed by loggers to access timber sales. For some logger constructed roads the Division may elect to leave the design at this stage without further engineering. Road design is based on the location chosen by field staff. The measurement of the alignment and field notes for design should be made with the designer of the road.

This may be the Area or Region Roads Specialist or the Bureau of Engineering staff. It is important

to have field staff involved in the preliminary design. They can provide information to the designer and ask pertinent questions to create a desirable design. Understanding why the final design differs from the original is the responsibility of the Field Forester. Several months should be allowed for layout and design for the higher class roads.

The recommended design specifications for DNR State Forest Roads are included in the Engineering Design Guidelines sheet in this section. Deviation from these should be carefully considered and discussed with the Bureau of Engineering or the appropriate St. Paul staff.

When designing a road a number of decisions must be made on the components of the road. The major components are discussed below:

**Subgrade-** This is the foundation of the road upon which the crown is placed. It is made out of the native material from the immediate vicinity of the road. Normally the material that is removed from the ditch area is placed on the subgrade to raise the road. The material that is placed in the subgrade should be free of large rocks, air pockets and organic material. The more material that is put into the subgrade the higher and stronger the road will be. However, the higher the subgrade the wider it must be. Where soil conditions are soft or severely puddled, it may be necessary to add a base course of 12 to 18 inches of large pit run material. This must be done before surfacing to support the traffic. All material that is put in the subgrade should be compacted for strength. See the diagram in this section for typical cross-sections of the subgrade.

**Crown-** This is the hard surface that the tires of the vehicles run on. Widths can vary from as narrow as 8 feet on a class 6 road up to 18 feet on a class 3. The crown is often made up of compacted class 5 gravel surfacing material for additional strength.

Surfacing material is used to protect the subgrade and maintain a smooth driving surface. Gravel depth is normally six inches, but this depth is not sufficient to carry heavy loads over soft or unsuitable subgrades. The width of the roadway will be dependent upon the amount and kind of traffic and the anticipated vehicle speeds. The crown should be sloped to increase water run-off. Normal slope 1/8" to 1/4" per foot. The typical diagrams in this manual show crown cross-sections.

**Horizontal curves-** The sharpness of the curve is expressed in terms of curve radius in feet. Larger radius curves are more gentle and can be taken at a higher speed. Class 6 roads may have curves with a radius of 50 feet whereas a class 3 road curves may have radii of 135 feet. When considering a curve radius you should take into consideration the anticipated speed of the traffic

and how important sight distance will be.

Grade- This is expressed in % and describes how steep the centerline of the road will be. Roads that will have light vehicle traffic and no logging traffic can have fairly steep grades. Roads that have logging traffic can also have fairly steep grades as long as they are very short and the approach is straight. A class 6 road may have grades up to 15%. Class 3 roads may have grades of 7%

Ditches- Forest roads normally have a V ditch without a flat bottom. Areas that are in heavy wet soils or in a high water table may need a deeper ditch than those in dry areas. The front slope of a ditch is often gentler than the back slope. However, slopes should also be determined by how stable the soil is. Heavy soils are more

stable than light sandy soils. A typical front slope may be 3 to 1 (33%) and a back slope may be 1 to 1 (100%). See the typical diagram for some ditch cross-sections.

### DRAINAGE - DRAINAGE - DRAINAGE

Drainage is THE MOST IMPORTANT FACTOR in the long term durability of a road. Water must be removed from the road surface and subgrade for the road to remain firm. Surface drainage may be accomplished by shaping the subgrade to drain and providing a means to remove water from the road edges. Ditching and leadoff ditches are the most desirable means of handling surface water. Proper placement of correctly sized culverts and raising the subgrade well above (2-3 feet) the water table should also be considered.

### CULVERT SIZING

Small culverts may be sized using the attached nomographs and the following instructions. The spacing between culverts should fit the conditions as called for in the BMP handbook. When culvert size is greater than 30 inches, the project must be referred to a hydraulic engineer. The BOE, a county engineer, SCS, or MnDOT can provide this assistance.

### USING THE NOMOGRAPH

1. Locate the proper graph ( pages J - 8 to J - 17 ) for the geographical location needed.

2. On the lower right corner of the graph choose the runoff relationship which best describes the conditions upstream of the desired location. This will provide the "K" value for the discharge curve.
3. Choose the appropriate "K" line on the graph.
4. Compute the upstream drainage area in square miles using quad maps.
5. Locate the intersection of the "K" line and the area on the graph, interpolating between area values if necessary.
6. Project the intersection to the left side of the graph and interpolate as needed to obtain the discharge (Q) in cubic feet per second (cfs) for the 50 year storm.
7. To obtain the 25 year storm flow multiply this value by 0.8.

**CHOOSE PROPER NOMOGRAPH DEPENDING ON TYPE OF STREAM FLOW!  
FOR FREE-FLOWING INSTALLATIONS - Use CHART 5**

8. Calculate headwater depth that is allowable in terms of culvert diameter. Normal culvert installation requires fill of 1/2 the pipe diameter, but not less than one foot. Water will go over the road at a depth of 1.5 diameters of the pipe. If more fill is available this ratio may be increased. If a minimum cover is needed, then 1.0 or 1.1 may be closer to the proper figure.
9. Choose the proper entrance type (headwall) configuration:
  1. Headwall or apron
  2. Pipe mitered (cut or beveled) to conform to the slope of the fill
  3. Projecting or pipe without apron or bevel

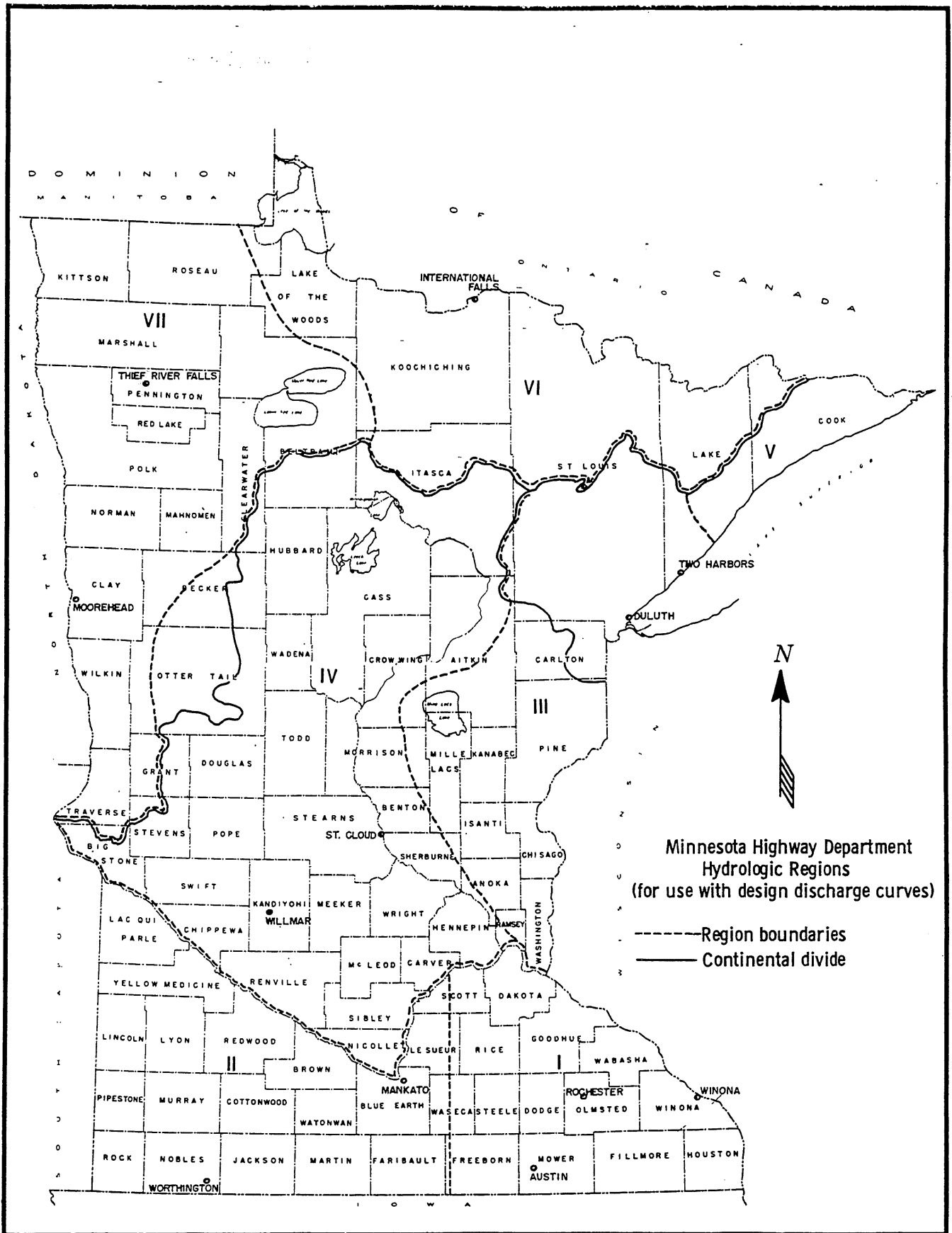
Locate the proper line at the right of the chart.

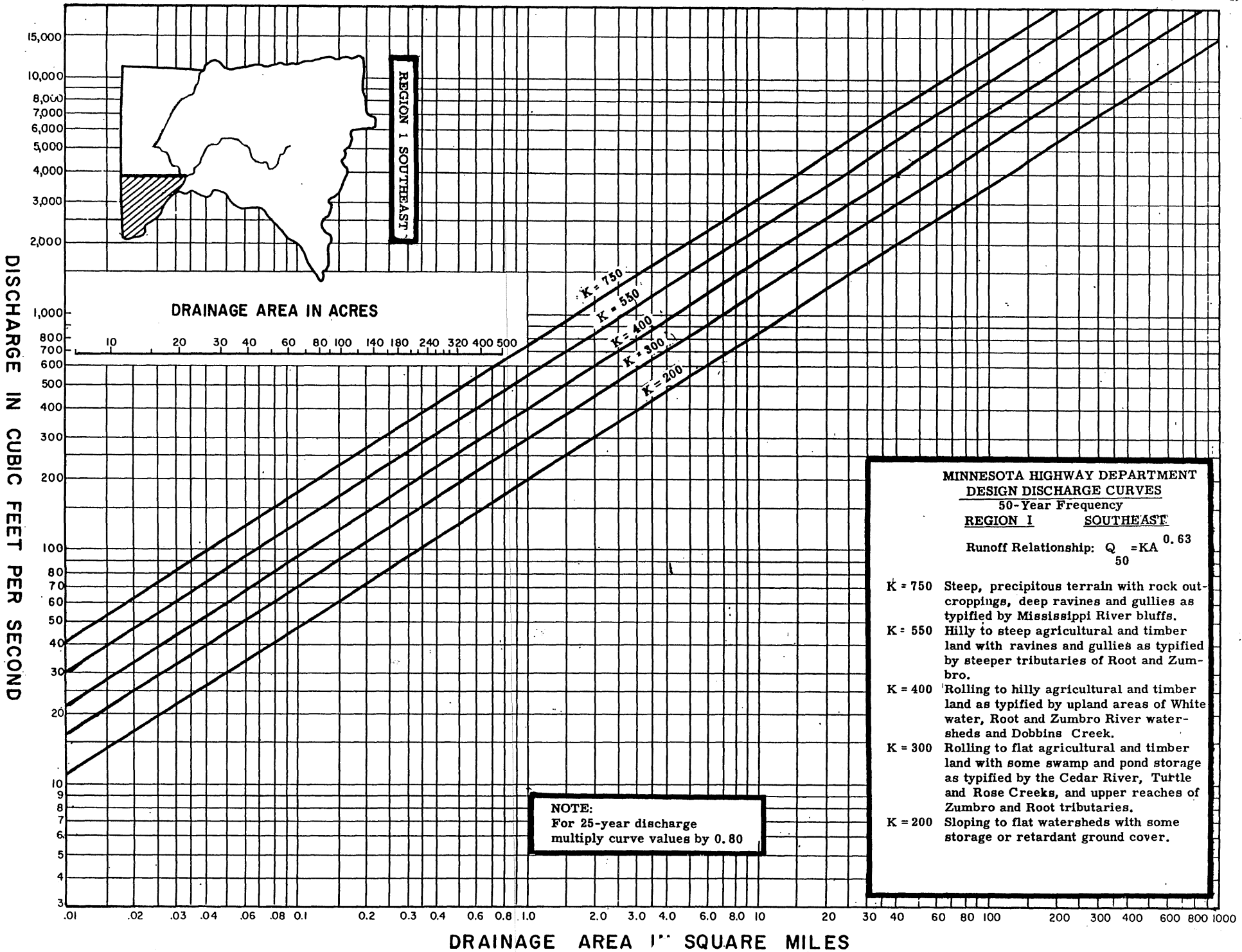
10. Use a ruler to project the headwater ratio from the proper entrance type line horizontally to the left-hand headwater ratio line.
11. Connect the point just located with a ruler through Discharge (Q) on the middle line to obtain

the culvert size on the line to the far left.

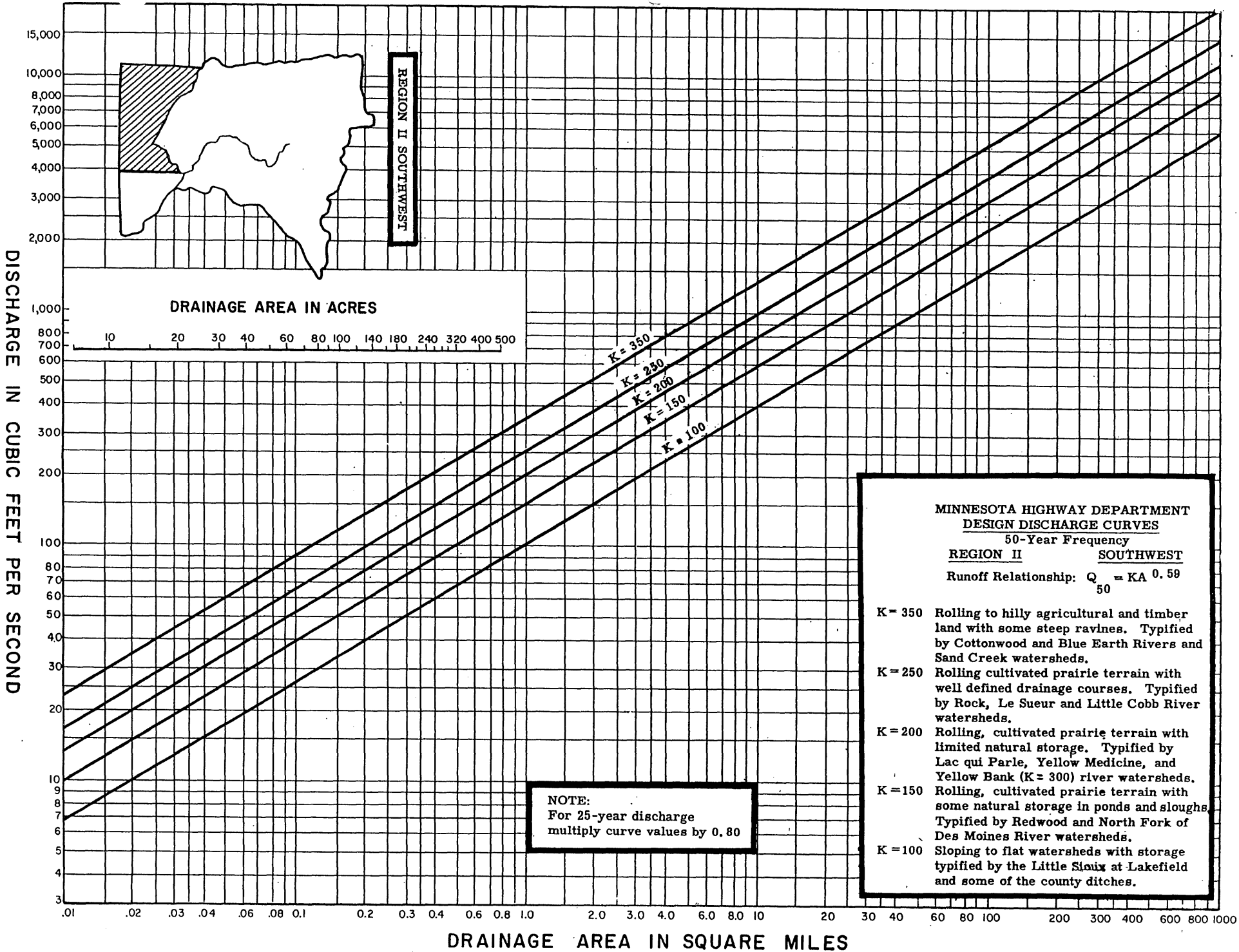
FOR SLOW FLOW OR NO-FLOW (BOGS) INSTALLATIONS - Use CHART 11

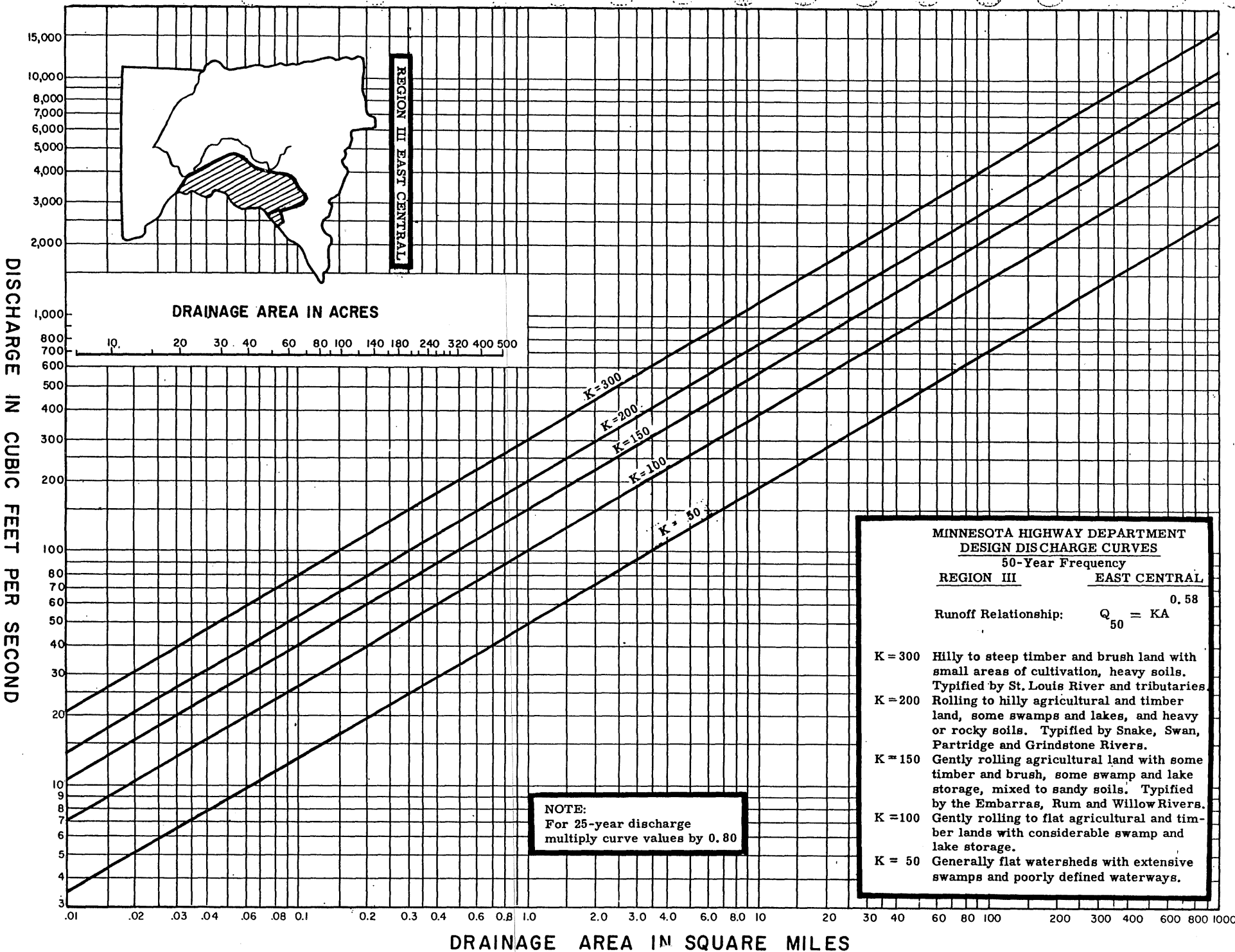
8. Calculate the depth of the allowable HEAD (H), in feet, above the top of the culvert. Normal culvert installation requires fill of 1/2 the pipe diameter, but not less than one foot. This would let water overtop the road at this depth. It may be possible to increase this depth if fill is available. If a minimum cover is needed, then 1.0 or 1.5 feet may be closer to the proper figure.
  9. Connect the point just located with a ruler through Discharge (Q) on the left-hand line to obtain an intersecting point on the Turning Line in the middle.
  10. Determine the approximate length of the culvert required for the road. Use 50 feet as a minimum length for these calculations.
  11. Choose the first (0.9) line for the entrance type (headwall) configuration at the center of the chart.
  12. Connect the length of the pipe on the entrance type curve with the intersection point on the Turning Line.
  13. Use a ruler to project this line to the culvert diameter line on the center left.
- For cross drains a 18 inch culvert is recommended as a minimum size. This size is easily cleaned with hand tools. Culvert length calculation is covered under the bridge section of this manual.

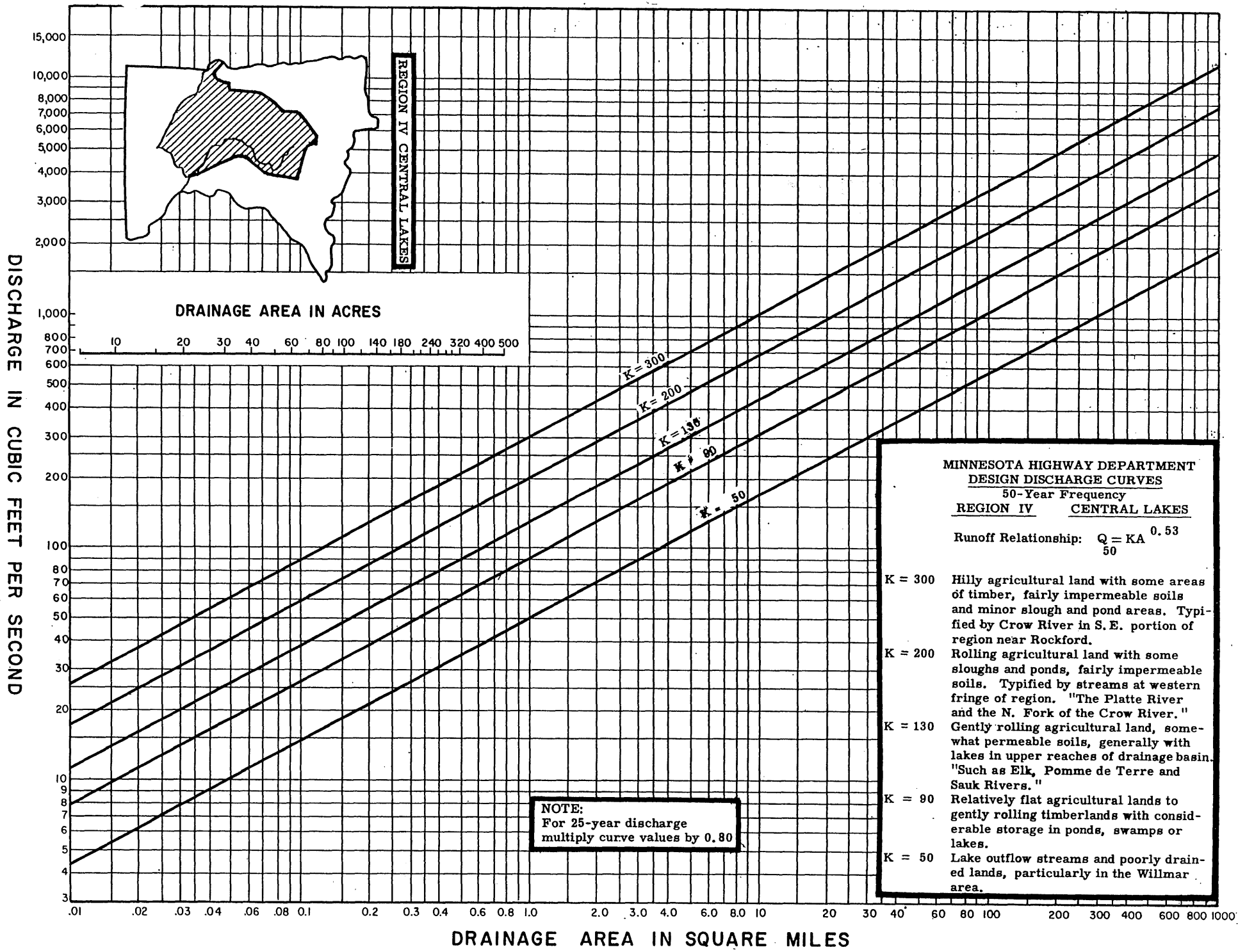


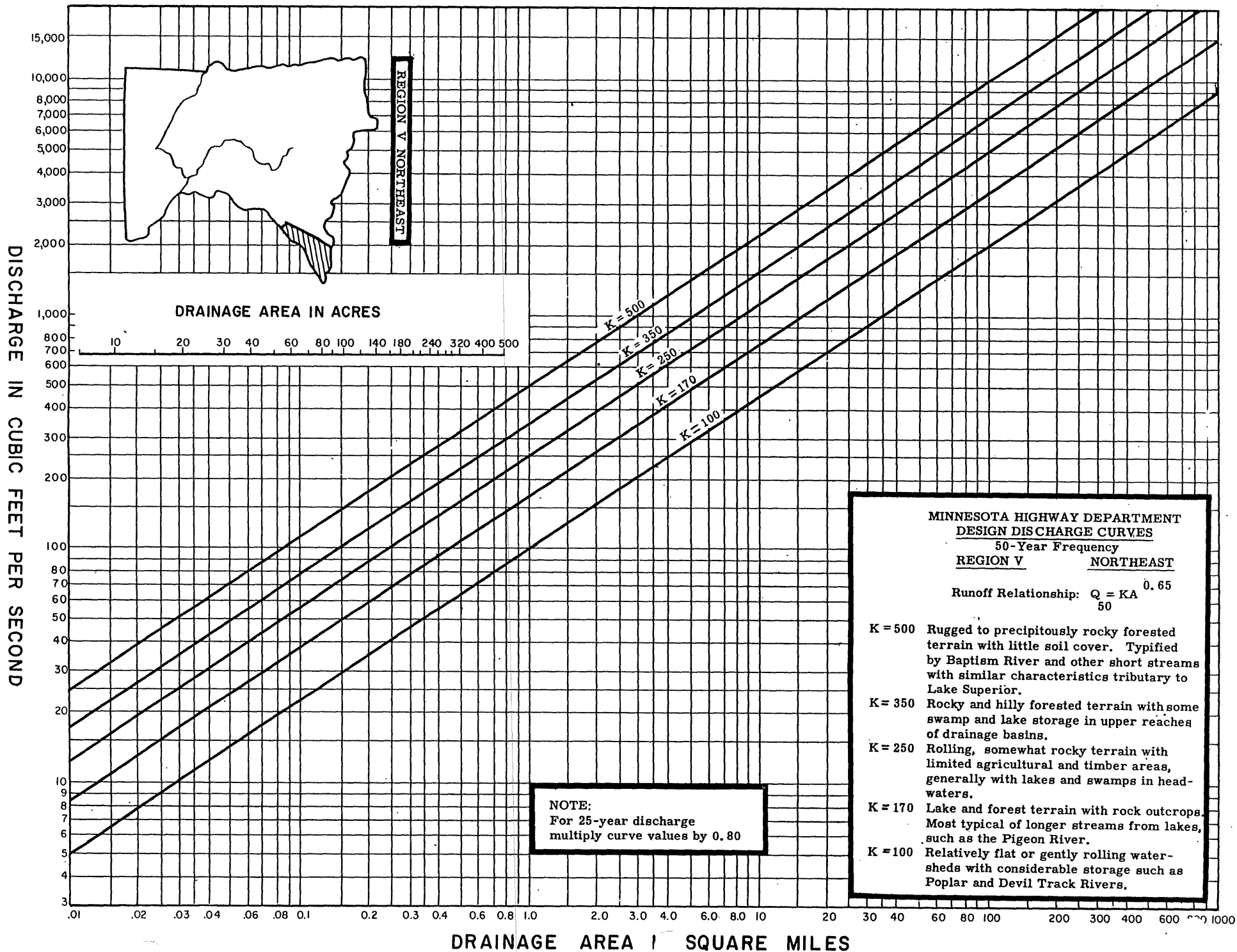


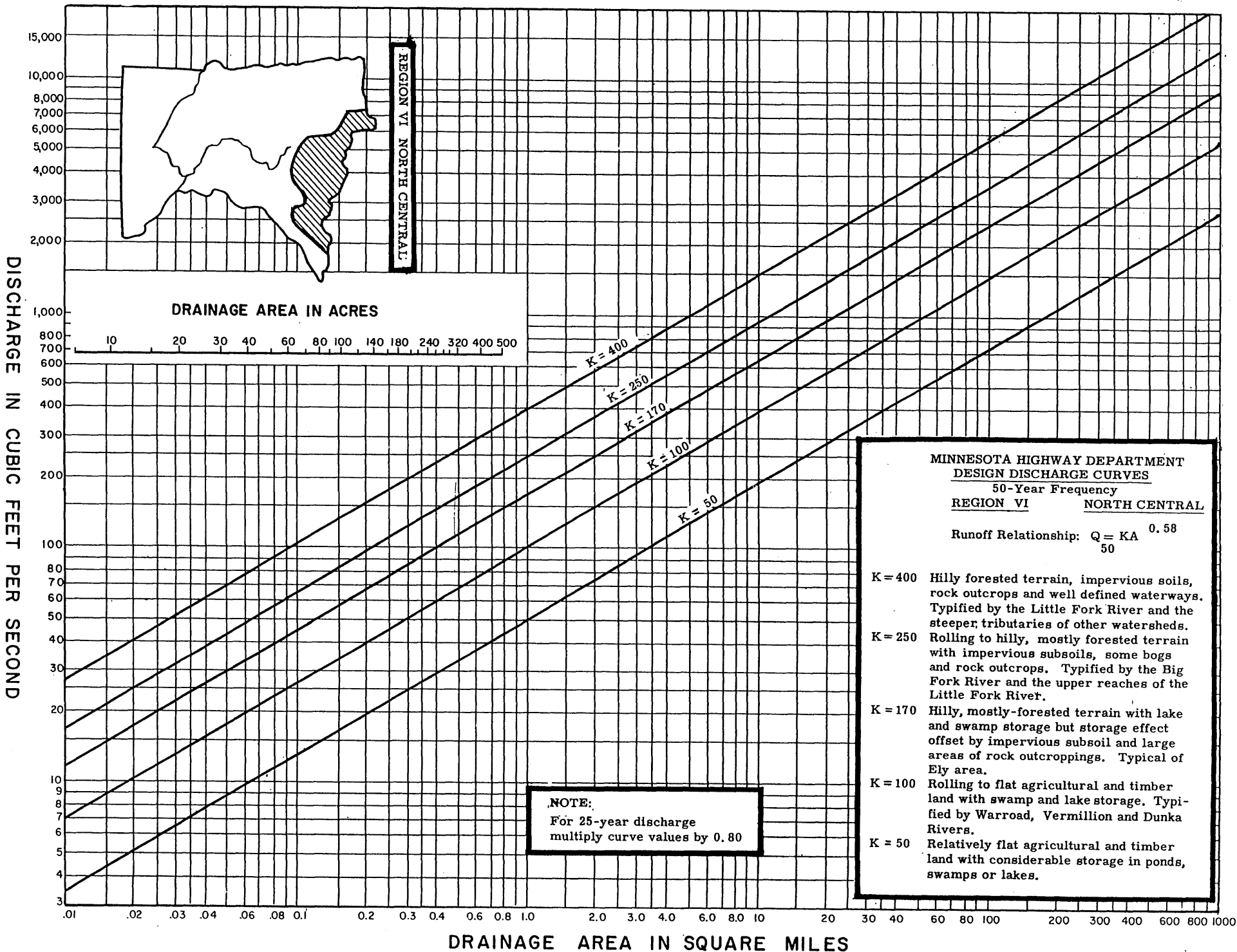












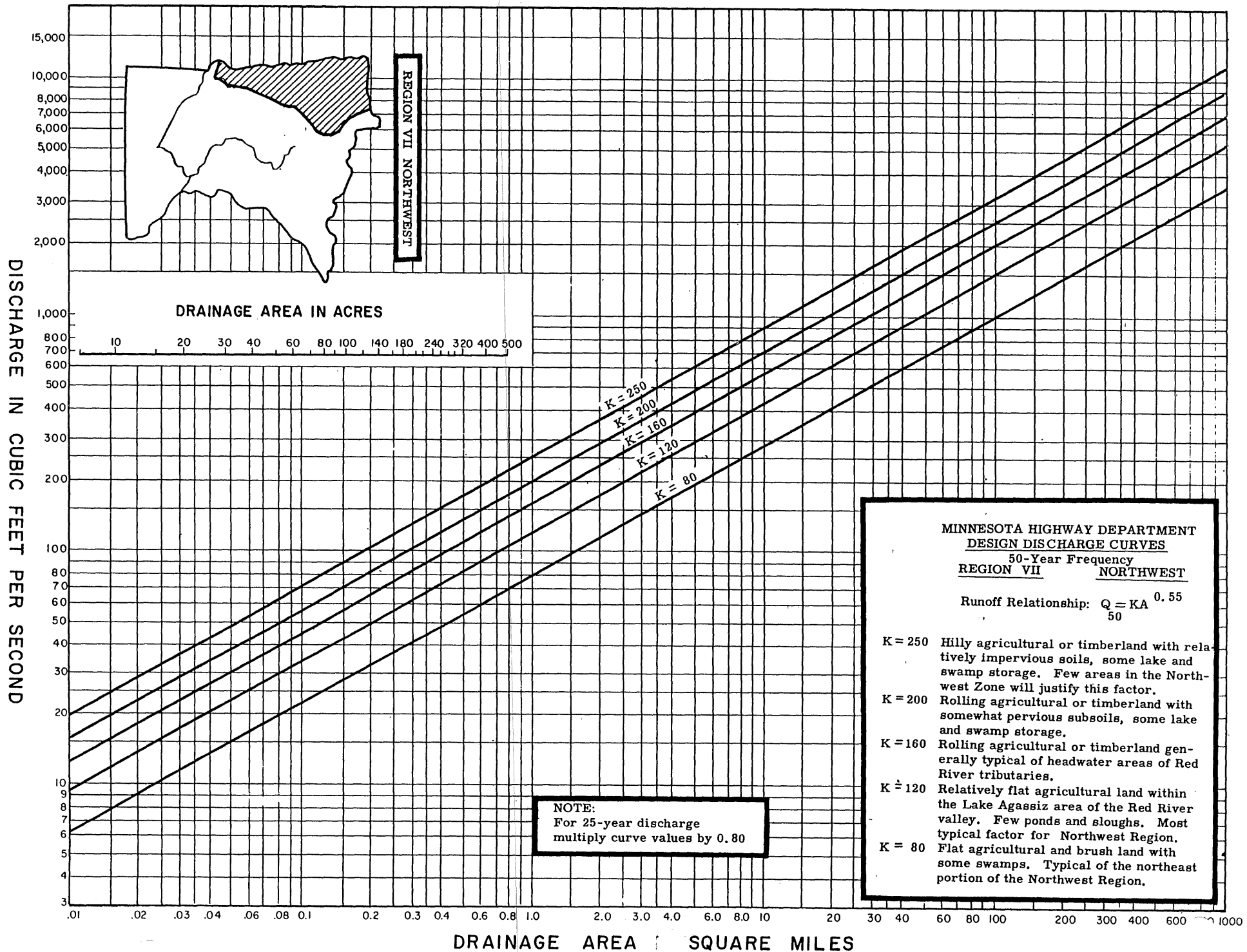
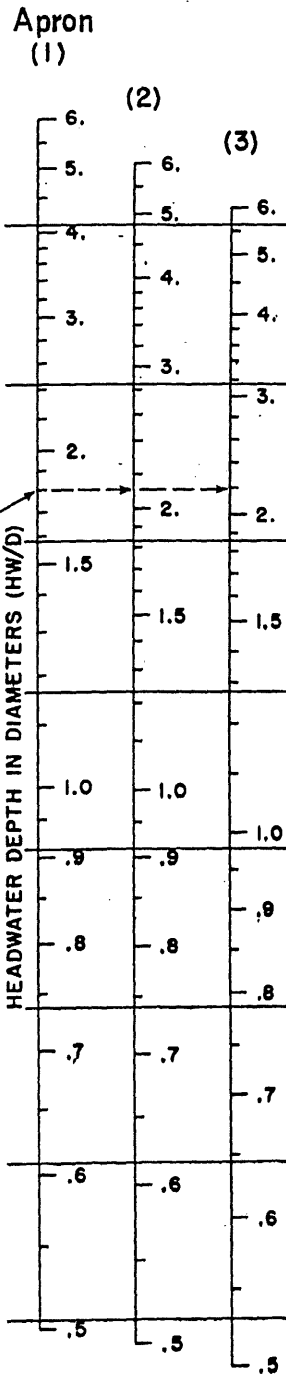
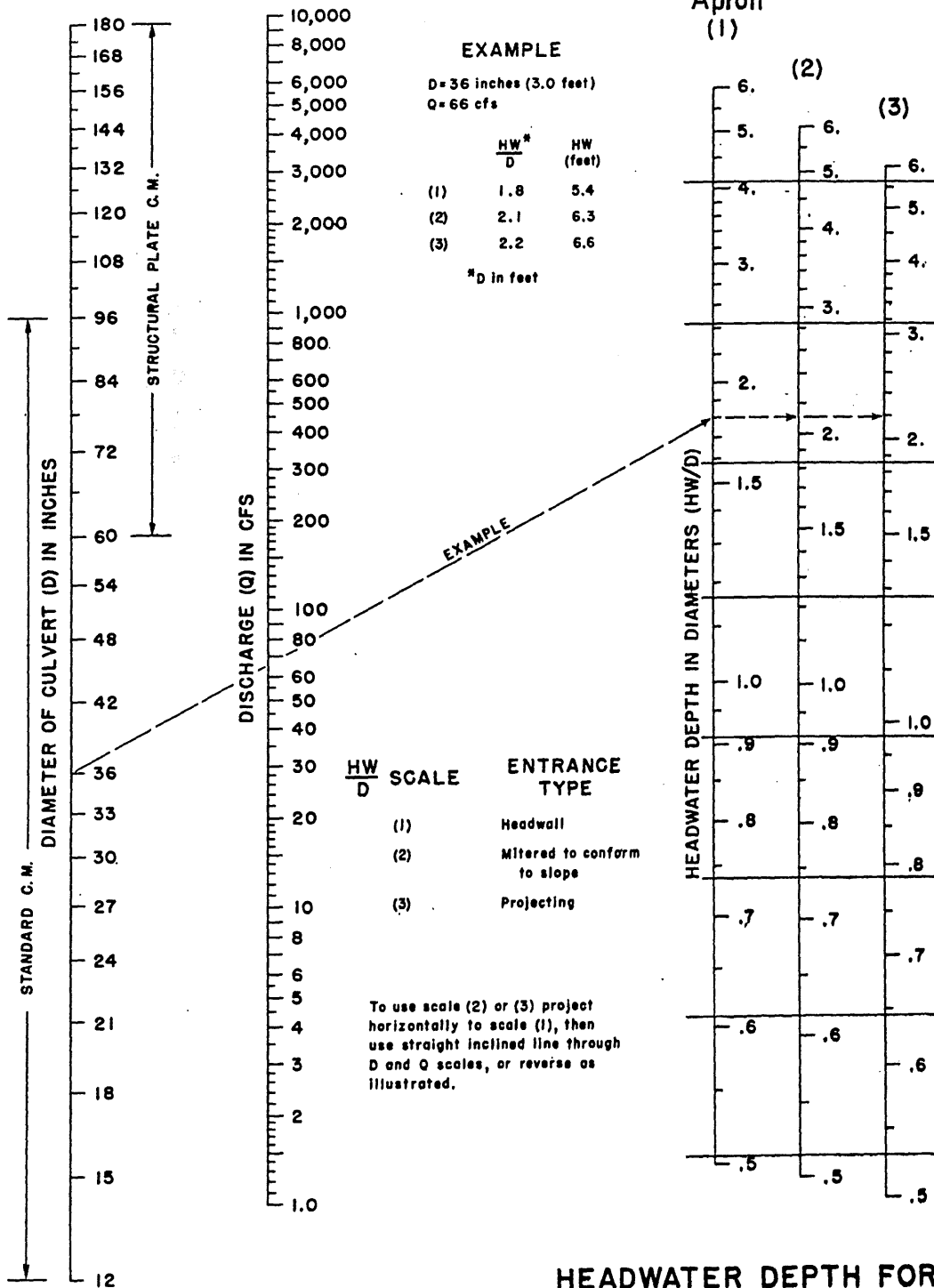
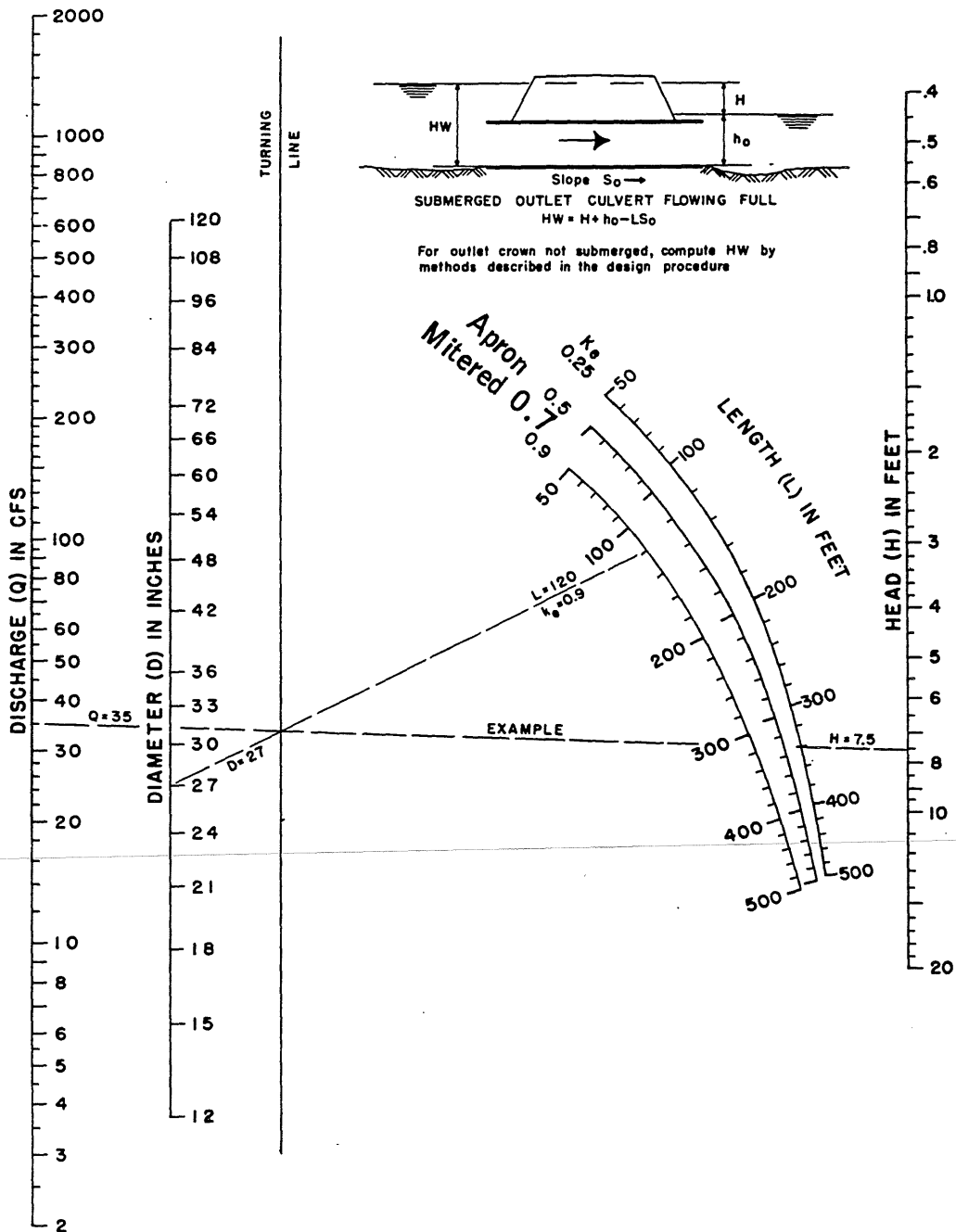


CHART 5



HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

CHART II



HEAD FOR  
STANDARD  
C. M. PIPE CULVERTS  
FLOWING FULL  
 $n = 0.024$



GEO-TEXTILE HANDY DANDY SWAMP GUIDELINE

- I. Use a 1/2" steel rod with a rounded tip and no handle.
- II. Hold the rod, not the coupling, with one hand and force it into the peat.
- III. If it goes down, easily, you have weak peat. If it goes down with difficulty, you have medium peat. If it takes both hands to force it down, you have strong peat.
- IV. Proceed down until the rod will go no further, recording the thickness, depths and relative strengths.
- V. Repeat this at least three times at each stop.
- VI. For all swamps with peat deeper than 15 feet, get someone to do a thorough analysis.
- VII. For Type 1 swamps with more than a 3 foot weak layer on top and Type 2 swamps with more than a 2 foot weak layer on the bottom, get someone to do a thorough analysis.
- VIII. For the remaining swamps consider these points:
  - A. Construct embankment when peat is frozen.
  - B. Use the lighter geo-textiles regularly for separation purposes unless you suspect that some extra strength must be added. In this case use the higher strength geo-textiles, avoid the medium strength geo-textiles.
  - C. Allow no construction equipment to operate on less than 2 feet of embankment.
  - D. Require the smaller sizes of construction equipment such as a Cat D 5 or a JD 450.
  - E. Keep larger dozers, large excavator's and all, even empty, scrapers off the embankment until it is completely constructed.
  - F. Use a 3 feet high embankment with 3:1 slopes.

G. Confine the peat while you add embankment -- don't push a narrow fill across the swamp and then come back to add material to the slopes. Complete the cross-section totally as you proceed across the swamp.

## ROAD CLASSIFICATION

State forest roads are assigned a class based on expected use, road design and safety requirements. Classification ensures that a range of alternatives are considered when selecting the appropriate road design. Classification presents development alternatives for varying types and intensities of forest road use and provides engineering information appropriate to such uses.

Under the Forestry system of classification (see next page), a range of six classes is used to describe forest road use and development opportunities. The system was developed to ensure the continued safe use and operation of state forest roads, while at the same time responding to the increased need for roads to be both durable and cost-effective. The new standards recognize recent advances in technology, expanded road use and safety needs and the desirability of conforming to generally accepted statewide road standards.

### Description of State Forest Road Classes

Class 1 - Roads designated as Class 1 are multi-purpose two-lane roads for use in all types of weather. Class 1 roads, unlike other forest roads, are generally hard-surfaced and include a two foot minimum shoulder width. They are developed only where heavy two-way traffic volumes are anticipated. Examples might include major timber haul roads, access to heavily used recreation areas or key transportation routes. Only two miles of state forest roads fall within this class.

Class 2 and 3 - Class 2 and 3 roads are also multi-purpose, two-lane roads. Both classes are developed as all-weather gravel surfaced forest roads. Because class 2 roads are four feet wider than Class 3 roads, they can accommodate substantially higher vehicle speeds. Engineering design specifications for Class 2 roads are also more exacting and uniformly applied. Class 2 and 3 roads serve a variety of purposes and may access moderately developed recreational sites.

Class 4 - Class 4 roads are multi-purpose, one-lane roads used to access timber areas where continued management is necessary. In addition, Class 4 roads provide access to primitive recreational facilities, fish and wildlife management areas or for hunting, fishing and other forms of dispersed recreation. The majority of longer, permanent state forest roads requiring routine maintenance are class 3 or 4 roads.

Class 5 - Class 5 roads are primarily timber harvest haul roads for use during dry periods or winter.

## STATE FOREST ROAD MANUAL

Road design is both economically and developmentally the minimum necessary for intended use. Road maintenance is also minimal and may not be required on a regular basis. Class 5 roads may also serve as recreational trails.

Class 6 - Class 6 roads are landing spurs and management access trails. They are extremely limited in their construction to a short period of use. They are inventoried in an effort to identify the access corridor more than the road itself. The only maintenance scheduled for these roads is periodic opening of the traveled way. Most class 6 roads will serve as recreational trails.

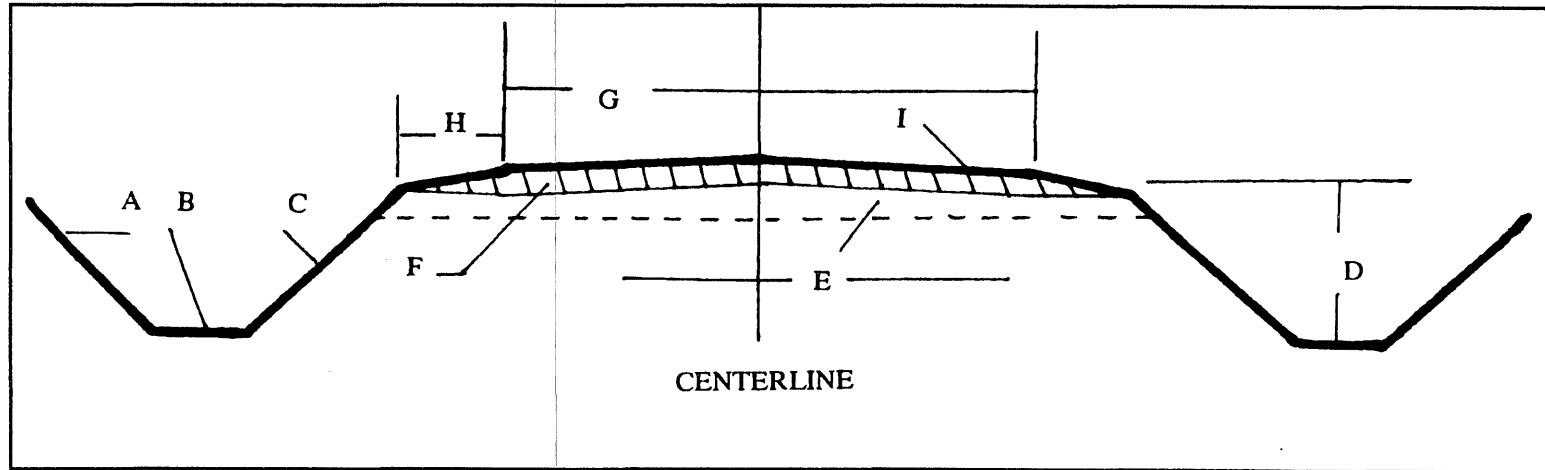
ENGINEERING DESIGN GUIDELINES

ROAD CLASS	1	2	3	4	5	6
Back Slope	2:1 or flatter	1.5:1 or flatter	1:1 or flatter	1:1 or flatter	1:1 or flatter	1/2:1 or flatter
Ditch Bottom	2' to 4'	V Ditch to 4'	V Ditch to 4'	V Ditch to 4'	V Ditch	V Ditch
* Side Slope	3:1	3:1	3:1	1 1/2:1	1 1/2:1	1 1/2:1
Ditch Depth	2' - 3'	1' - 2'	1' min.	1' min.	1/2' min.	1/2' min.
Base and Sub-base Thickness	Site Specific	Site Specific	Site Specific	Site Specific	Minimal Use	Native Material
Compacted Surfacing Thickness (when used)	Asphalt 2" Min.	Rock 6" Deep	6" Deep	Optional 6" Deep	Optional 4" Deep	None
Roadway Width	26 ft	22 ft	18 ft	14 ft	12 ft	10 ft
Shoulder Width	2' Min.	None	None	None	None	None
* Crown Slope	1/8" - 1/4" ft	1/8" - 1/4" ft	1/8" - 1/4" ft	1/8" - 1/4" ft	1/8" - 1/4" ft	Not Required
Design Speed	45 MPH	40 MPH	25 MPH	20 MPH	20 MPH	10 MPH
Structural Design Width	2 Lane	2 Lane	1 Lane	1 Lane w/Turnouts	1 Lane w/Turnouts	1 Lane
Sight Distance	450 ft min.	375 ft min.	200 ft min.	175 ft min.	175 ft min.	100 ft
Curve Radius	600 ft	450 ft	135 ft	75 ft	75 ft	50 ft
Turn Outs	None	None	Optional	Inter-visible	Min. 4/mile	Optional
Grades not to Exceed (dependent on soil stability)	7 - 8% Slope Short Grades 10%	7 - 8% Slope Short Grades 10%	7 - 8% Slope Short Grades 10%	8 - 10% Slope Short Grades 12%	8 - 10% Slope Short Grades 15%	15%
Bridge Structure and Loading	HS - 20	HS - 20	HS - 20	HS - 20	HS-20	None Used
Flood Design for Bridges & Culverts Larger than 24"	Design for 50 year flood	Design for 50 year flood	Design for 50 year flood	Design for 25 year flood	Design for 25 year flood	Not Used
Intersections	Adequate View Corridors	Adequate View Corridors	Adequate View Corridors	Adequate View Corridors	Adequate View Corridors	Adequate View Corridors
Right of Way	66' min. on private property	66' min. on private property	66' min. on private property	66' min. on private property	66' min. on private property	33' min. on private property
Canopy Opening Always Provide for Adequate Road Drying	5' beyond top of back slope minimum	5' beyond top of back slope minimum	minimum of 5' from top of backslope or from shoulder	minimum of 5' from top of backslope or from shoulder	minimum of 5' from top of backslope or from shoulder	minimum of 5' from shoulder

\* Base, Sub Base and Shoulders will have this same slope

# STATE FOREST ROAD MANUAL

## STATE FOREST ROAD CROSS SECTION



- A - BACKSLOPE
- B - DITCH BOTTOM
- C - SIDESLOPE
- D - DITCH DEPTH
- E - BASE AND SUB-BASE THICKNESS
- F - GRAVEL THICKNESS
- G - ROADWAY WIDTH
- H - SHOULDER WIDTH
- I - CROWN SLOPE

## STATE FOREST ROAD MANUAL

### GRADATION OF VARIOUS AGGREGATES

#### Base and Surfacing Aggregate - Total Percent

Passing Sieve Size	Class									
	1	2	3	3A	4	4A	5	5A	6	6A
3"										
2"			100	100	100	100				
1"							100	100	100	100
3/4"	100	100					90-100		90-100	
3/8"	65-95	65-95					50-90		50-85	
#4	40-85	35-70	35-100		35-100		(a) 35-80 (b) 35-70	(a) 35-80 (b) 35-70	35-70	35-70
#10	25-70	25-45	20-100		20-100		(a) 20-65 (b) 20-55	(a) 20-65 (b) 20-55	20-55	20-55
#40	10-45	12-30	5-50	10-50	5-35	10-35	10-35	10-35	10-30	10-30
#200	(c) 0-15 (d) 10-15	5-13	5-10	3-10	4-10	3-10	3-10	3-10	(a) 3-7 (b) 4-8	(a) 3-7 (b) 3-8









**K. SPECIFICATIONS AND CONTRACTS**

## TYPES OF BIDS

The three types of equipment rental agreements are described in Operational Order No. 43. Class I allows the Area to let a bid up to \$10,000 and Class III allows the Region to let a bid for any amount. Although not mandatory, it is recommended that performance security be required on Class I and III bids.

Requests for bids are divided into three classes. Each are distinct in the procedure required. A formal performance bond is always required for Class II bids, but optional for Class I & III.

**Class I (Local Bid).** Equipment rental, construction, and maintenance projects with a maximum value of \$10,000.

1. The Area prepares bid package and solicits bids by one of the following:
  - A. Written unsealed bids.
  - B. Written sealed bids.
  - C. Telephone quotes may be used if the project cost is under \$1,500, or is an emergency and approved in writing by the Regional Business Manager. Insurance requirements apply and specifications must be pre-written and read to each bidder. A Purchase Order must be made up by the Area.
  - D. Although not required, it is recommended that bids be advertised in a newspaper at least 7 days before bid opening. It is also recommended that written sealed bids be used.
2. Bids are opened by the Area.
3. The Area completes the bid tab form. If less than three bids are received, explain on back of bid tab form and 502SA (Purchase Order) State copy only:
  - A. Number of vendors contacted or attached bidders list.
  - B. Explain if less than three contacted.

4. Send the following to the Region:
  - Bid tabs
  - All bids
  - Bidder list
  - Copy of newspaper adds
  - Completed purchase order (502SA)
5. The Business Manager notifies the successful bidder of the bid's acceptance, and asks him for his insurance and performance security (when required). When he receives these he will send the bidder, via the Area, a purchase order and Notice to Commence Work.
6. The Area certifies performance, codes the invoice, sends invoice and purchase order to the Region for payment.

**Purchase Orders (No Bonding Required.)** Projects costing under \$1,500.

1. Get three phone quotes and record on Bid Record (NA-00125.)
2. Complete purchase order and send to the Region. Must have copy of auto insurance if state equipment will be transported by contractor.
3. Region sends to Business Manager for encumbering and returns to Area.
4. The Area certifies performance, codes the invoice, sends invoice and purchase order to the Region for payment.

**DNR Annual Plan for Professional Services**

This procedure can be used to contract for professional/technical services. Each contract is limited to \$5,000 per fiscal year.

1. A request should be submitted to be put in the plan. This is done before the beginning of the fiscal year.

## STATE FOREST ROAD MANUAL

2. A person can be hired with or without using Job Service. It's best not to contract by the hour as the IRS could rule that the contractor is an employee.
3. Form NA 00047 Expenditure Authorization Agreement is used to encumber funds and as the signed agreement between the DNR and contractor.

**Class II (100% Performance Bond Required).** Construction and maintenance projects costing more than \$10,000. Usually only used for road projects bid by Bureau of Engineering.

1. Area submits project proposal to Region for approval.
2. Job description and specification is prepared by Area and/or Engineering and submitted to Region.
3. Business Manager will complete bid package and advertised at least 7 days in newspapers and public bulletin board prior to opening.
4. Bids are opened by Business Manager.
5. Business Manager notifies successful bidder and has him complete and **return the following forms:**
  - A. Contract.
  - B. 100% formal performance bond. No security is acceptable in lieu of bond.
  - C. Insurance.
  - D. Human Rights Compliance. (Contracts over \$50,000)
  - E. Affirmative Action Compliance. (Contracts over \$50,000)
6. Business Manager sends contractor and Area a copy of the contract and a Notice to Commence Work.
7. The Area or Regional Engineer certifies performance, codes the invoice and sends to the Region for payment.

**Class III (Forestry Projects).** Projects costing any amount.

1. Area submits job description and specification to Region.
2. Region will complete bid package and advertise at least 5 days prior to opening in newspapers and Region bulletin board.
3. Bids are opened at Region.
4. Business Manager notifies successful bidder and has him complete and return the following forms:
  - A. Contract.
  - B. Performance bond (when required).
  - C. Insurance
  - D. Human Rights Compliance. (Contracts over \$50,000)
  - E. Affirmative Action Compliance. (Contracts over \$50,000)
5. Business Manager sends contractor and Area a copy of the contract and a Notice to Commence Work.
6. The Area certifies performance, codes the invoice and sends to the Region for payment.

**BONDS**

**Bid Security:**

- Class I: Optional. Minimum of 5% if required.
- Class II: 5% required. It can be a formal bond, certified or cashier's check.
- Class III: Optional. Minimum of 5% if required.

The bid security may be used as performance security if the amount is the same for each, and if

the bid security is not a surety bond. This must be stated in the bid specifications.

A contractor will forfeit his bid security if he is low bidder and does not want the contract. Bid securities will be returned to unsuccessful bidders within 5 days, and to the successful bidder when the Business Manager receives his signed contract, insurance, and performance security (if required).

Performance Security:

Class I: Optional. Minimum of 5% of the bid price, if required.

Class II: Must be a 100% formal performance bond.

Class III: Optional. Minimum of 5% of the bid price, if required.

The bid and performance security can be a:

Formal bond  
Certified or cashier's check  
Postal, bank, or express money order  
Assignable bonds or notes of the U.S government  
Assignment of a bank savings account

---

Investment certificates  
Letter of credit.

The performance security can be held for 90 days after completion of work.

We can assess liquidated damages if a contractor finishes after the deadline, but still completes the project. These damages should agree with the schedule listed in Solicitation and Submittal of Bids.

None of our specifications should conflict with Operational Order 43. It must also be remembered that to legally use a contractor's bond or performance security, we must be able to document real monetary damages.



### Use of Performance Security and Liquidated Damages

To clarify the use of Performance Securities and Liquidated Damages, the following should be added to specification sheets:

"A \_\_\_% performance security, as described in the SOLICITATION OF BIDS, is required of the successful bidder and must be submitted within 20 days of bid award. This security will be used in conformance with Mn. Statutes Sec. 574.26 through 574.264, which includes the additional costs of having another contractor complete the work if a default occurs, or to cover other obligations incurred by this contract.

If the completion dates are not met, damages will be assessed according to the schedule of Liquidated Damages in the SOLICITATION OF BIDS.

If work is not done according to the specifications, payment for those items will be withheld."

This language has been approved by the Attorney General.

## **IV. INSURANCE REQUIREMENTS**

Minimum state "no-fault" automobile insurance is required for labor intensive projects, such as tree planting, if DNR equipment or supplies will be transported by the contractor. This includes transportation of seedlings. These types of projects do not require combined single limit liability insurance (excludes chemical application).

Combined Single Limit Liability of \$300,000 is required for equipment with operator contracts includes hand application of chemicals, but not mechanical application).

Combined Single Limit Liability of \$500,000 is required for all other Class I, II, & III bids including mechanical ground application of chemicals.

Personal injury of \$200,000 and property damage of \$600,000 for contracts involving aircraft.

Workmen's Compensation Insurance of at least \$100,000 must be provided for a contractor's and subcontractor's employees. If all parties are partners this insurance is not required.

## V. BIDDING and PAYMENT

Bids should be sent to contractors that are definitely interested. Notice of Bid cards can be sent to those that may or may not be interested.

Solicitation and Submittal of Bids (with attached spec. sheet, if necessary) will be used for Class I and III bids.

The successful bidder will be paid only the number of units actually completed at the bid price. Use of the planting and site prep invoice forms (See Forms section) when submitting bills will make it easier for the Region to track bills by project. The entire coding block should be completed by the Area before sending to the Region. Great care must be used when coding the sequence number. A copy of the Purchase Order should be attached to the bill for cross-checking by the Region.

All state contracts are considered Lump Sum unless stated in the specifications that they are Unit Price Contracts. Most road bids will be lump sum and the contractor will be paid for the amounts indicated in the bid, regardless of final quantities. However, if only exact amounts (trees planted, acres treated, etc) will be paid for, the specifications must say this is a unit price contract and state when quantities will be determined. A statement like the following should be used:

"Payment will be for trees actually planted, as determined by the Project Supervisor, after work is completed. This is a unit price contract, not a lump sum contract."

## VI. ENCUMBRANCE OF FUNDS

Equipment rental agreements and contracts can be made one fiscal year and completed the following year, if the funds are encumbered prior to the first day of the new fiscal year. All bid classes can be bid by the hour or unit (acres, M trees, cubic yards, etc.). However, it is recommended to use a per unit basis whenever possible.

Funds for Area Bids will be encumbered by the Region Office and a Purchase Order sent to the Area. This will help account for all committed funds and eliminate allotment overruns at the end of the fiscal year.

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**RECONSTRUCTION - SAMPLE BID**

**Mn DNR-DIVISION of FORESTRY  
GENERAL CONDITIONS  
REFUGE ROAD  
BID 89-9**

**GENERAL**

Work consists of: clearing 8.5 acres; shaping, grading, and compacting 3.5 miles; installing culverts; spreading and compacting 6,000 cu. yds. of gravel (compacted measure).

**Location**

The project is in the Paul Bunyan State Forest, Hubbard County, north of Nevis.

**Contract Administrator**

Jack Bugge; DNR-Forestry, Park Rapids, Mn. 56470. Phone 218-732-3309.

**Completion Date**

All work must be completed by November 30, 1991.

**Pre-bid Meeting**

A pre-bid meeting will be held February 23, 1991 at 1:00 pm for showing the project to bidders. The meeting will be held at the junction of Refuge Road and County road 91, 12 miles north of Nevis.

**Preconstruction Meeting**

After the Executed File Copy of the Contract has been issued but before construction begins the Contract Administrator will advise the contractor of the time and place of the preconstruction meeting.

## **Specifications**

The term MnDOT Spec. refers to the book of Specifications published by the Minnesota Department of Transportation.

These Standard Specifications will be superseded by Specific Requirements whenever the two sections do not agree.

## **CLEARING and GRUBBING**

Areas that will be excavated, filled, or designated will be cleared and grubbed. Clearing requires removing trees, brush, windfalls, and other vegetation. Grubbing requires removing stumps, roots, and other remains. The contractor shall be responsible for the removal and disposal of the resultant debris.

Timber may be purchased by the contractor or left for removal by the DNR. It must be cut in 100 inch lengths, separated by species, and piled by the road if not removed by contractor. Merchantable timber may not be buried or disposed of as debris.

Clearing and grubbing debris will be deposited in designated areas. These areas will be out of sight, not over 5 feet tall, and covered with dirt. Debris shall not be placed under the roadway or shoulder fills.

A burning permit must be obtained from the DNR if any material will be burned.

Clearing width will be a minimum of 10 feet horizontal from the shoulder of the road, or 5 feet beyond the top of the cut.

On existing fills greater than 15 feet in height the clearing shall be limited to 5 feet horizontal from the shoulder. Stumps shall be cut at or below ground level so they will not be uncovered by maintenance machinery.

## **GRADING AND COMPACTING - SUBGRADE**



### Ordinary Compaction

The roadway embankment shall be constructed according to MnDOT SPEC 2112 for Subgrade Preparation. The "required density" shall be the density obtained by Ordinary Compaction, MnDOT SPEC 2105.3. The subgrade shall be constructed to the slope and cross-section shown (crowned 2-4%) for the finished project.

\* NOTE: This requires a vibratory or tamping (sheepsfoot) roller.

## **FINAL GRADING - SUBGRADE**

### Specifications

This shall include the work necessary to shape cuts and fills as shown. Surfaces must be smooth and uniform with slopes blended smoothly into the surrounding terrain. Depressions which can hold water will not be permitted in roads, ditches, or parking areas.

### Subgrade Approval

The Contract Administrator shall approve the subgrade prior to placement of surfacing material.

## **DITCHES**

The ditch dimensions shown are minimums. They may have to be increased to provide adequate drainage or to allow the minimum 12 inch subgrade cover on culverts.

## **CULVERTS**

### Steel and Aluminum

Steel and aluminum pipe, connecting bands, and aprons shall be the size, gauge, and length specified. They shall conform to MnDOT SPEC 3226 and 3225. Steel pipe shall be galvanized according to MnDOT SPEC 3392 and 3394.

Connecting bands shall be a minimum of two feet in length and a minimum of 16 gauge, or up to 2

gauges lighter than pipe, whichever is heaviest.

All corrugated pipe (annular or spiral corrugated) shall have annular corrugated ends.

### Plastic

Plastic pipe shall be the length specified and meet MnDOT Spec. 3245, 3247 or 3278. The connecting bands (mechanism) shall be those recommended by the manufacturer and hold adjoining sections in a secure, watertight manner.

### Installation

The pipe shall be installed as specified, and laid according to MnDOT SPEC 2501. Bedding shall be Class C as outlined in MnDOT SPEC 2451. Culvert shall have a camber of 1-2 inches and drain from inlet to outlet.

Backfill on both sides of the pipe shall be tamped simultaneously. Space between pipes in a multiple culvert should be half the pipe diameter. Also, fill over pipes should be half the culvert diameter, but not less than 1 foot of subgrade.

Select fill shall be used that is free of stones over 2 inches, large lumps or clods, and organic matter. It shall be placed in layers not over 6 inches uncompacted thickness. Each layer shall be compacted according to contract specifications for embankment compacting. Special care shall be taken to compact under the pipe.

Until the pipe is covered to a depth of 2 feet, earth moving equipment will not be permitted to operate over it.

Prior to final acceptance, all culverts shall be cleared of debris.

## **GRAVEL SURFACING**

### Spreading

Gravel shall be spread in layers 6 inches or less, according to MnDOT Spec. 2211, or as described in the Specific Requirements of this contract. Each layer shall be spread and compacted before

spreading the next layer. The surface of each layer shall be maintained with uniform texture and firmly keyed particles. Continue until the next layer is spread, or until the completed base is accepted.

### Watering

If necessary, water shall be applied after three passes, or as directed by Contract Administrator, to aid compaction. A tank with pneumatic tired wheels and distributing bars or other apparatus to ensure uniform water distribution will be used.

### Compaction

The road shall be compacted according to MnDOT Spec. 2211.3C2, Ordinary Compaction. The gravel shall be thoroughly compacted with steel wheeled rollers and/or pneumatic tired rollers. All rolling equipment shall deliver at least 200 lbs. per lineal inch of rolling width. A minimum of six passes shall be made.

### Crowning

The finished surface shall be crowned or cross-sloped, according to drawings, to ensure adequate drainage and shall be smooth and continuous. Depressions which can hold water will not be permitted.

### Haul Roads

The contractor shall be responsible for maintaining the haul roads. He shall grade and return them to their original or better condition, so they are passable and free of ruts.

## **CONTRACT CLOSEOUT**

### CLEANUP

The contractor shall remove and legally dispose of rubbish and debris resulting from his work. This shall be done before equipment is removed from the site. The area must be left in a clean and presentable condition

### MAINTENANCE

The contractor will maintain all finished work until final acceptance by the Contract Administrator. All expenses for this maintenance shall be borne by him.

### ARCHEOLOGY

Work will stop if archeological remains are discovered. The Contract Administrator will be immediately notified of these findings.

### REMOVAL ITEMS

The contractor shall dispose of items to be removed except those the DNR wants to retain. Care shall be taken in removing these items.

### **MEASUREMENTS**

Bids will awarded to the lowest TOTAL BID and should include labor, equipment, and materials (if specified). Measurement for adjustments shall be made in according to the units of measure on BID SHEET.

Measurement for payment of fill and surfacing will be made by sampling in place thickness.

### **PERFORMANCE SECURITY and LIQUIDATED DAMAGES**

#### Performance Security

The performance security will be used in conformance with Mn. Statutes Sec. 574.26 through 574.264 This includes additional costs of having another contractor complete work if a default occurs, or to cover other obligations incurred by this contract.

#### Liquidated Damages

If work is not completed on time, damages will be assessed according to the schedule of Liquidated

Damages in the SOLICITATION OF BIDS. If work performed according to specifications, payment for those items will be withheld.

**ITEMS NOT COVERED**

2

Items not covered in these Standard Specifications are covered in the SOLICITATION AND SUBMITTAL OF BIDS. They include:

1. Bid security
2. Insurance requirements
3. Performance security
4. Schedule of liquidated damages

**SPECIFIC REQUIREMENTS  
REFUGE ROAD  
BID 89-9**

1. **CLEARING and GRUBBING:** Road clearing widths shall be widened 5 feet where fills exceed 5 feet in height for a length of 200 feet or more (where sufficient width presently exists).
2. **DITCHES:** All ditches shall drain into natural ground. The typical dimensions of 6 inches in depth with a "V" bottom are minimums and shall be adjusted to provide adequate drainage. They shall be day lighted wherever possible. Lead off ditches shall be constructed to remove water from main ditch. This work will be considered incidental to the contract.
3. **SURFACING:** Gravel surface shall consist of 6" compacted material from the stockpiles along the Refuge Road at mile points 0.60 and 1.24. All roadways and turnouts are to be surfaced with an uniform layer of material. Side intersections shall be tapered out 30 feet from the centerline of the main road.

NOTE: No allowance has been made for swell or compaction: All figures are in place compacted yardage.

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NOTE: The gravel for this contract is being crushed under a separate contract and may not be wholly available until August 16, 1991. No hauling will be permitted from the pit at mile point 1.24 until the contractor has completed the crushing.

**CONSTRUCTION NOTES**

**BID 89-9**

STATION

MILE POINT

WORK DESCRIPTION

- 0.00 Widen intersection by moving to left (see Typical). Begin clearing 50 feet wide. Drain intersection as appropriate. Begin 6" surfacing
- 0.02 End of full width for intersection detail. Begin double ditch and crowned surface (Typical A). Daylight ditches where possible
- 0.20 Maintain road approach on left (see Typical). Install 18" X 38' culvert with 2 aprons under approach.
- 0.25 Begin one foot lift using pit run material from pit #1. Taper from 50 feet back.
- 0.30 Construct catch basin left - 10 ft wide and 15 ft long on the bottom. Block left ditch below culvert. Install 18" X 38' culvert with 2 aprons from catch basin to lead off ditch (approx. 60 degree skew to centerline). Construct lead off ditch on right side for approx. 50'.
- 0.32 End of full one foot lift taper 50 feet ahead.
- 0.38 End ditches left and right side
- 0.40 Begin Typical B. Construct turnout right (see Typical)
- 0.57 Maintain access to existing horse trail on right.
- 0.60 Location of Gravel Pit # 1 and borrow source. Existing stockpile contains \_\_\_\_\_ cu. yds.
- 0.65 Maintain access left to existing width.
- 0.70 Begin Typical D. Construct turnout right (see Typical).

## STATE FOREST ROAD MANUAL

- 0.80 Clear 5 feet back from top of cut on both sides. Left bank is suggested for fill to widen road.
- 0.82 Drain right shoulder into swale. Install 18" X 54' culvert with 2 aprons under approach on left to drain water from left shoulder. A small catch basin is required 5 ft. X 10 ft. minimum. Construct approach left (see Typical) widen as necessary for truck access. Begin Typical B.
- 0.87 Clearing is limited to 10 feet from each shoulder across this fill.
- 1.03 Maintain trail access to right. Begin alternating Typical A and B as necessary. Construct turnout right (see Typical).
- 1.24 Maintain trail access left and parking area and access to Pit # 2 on right.
- 1.30 Construct turnout right (see Typical).
- 1.38 Maintain access road right (see Typical).
- 1.40 Begin Typical C
- 1.48 Begin Typical A
- 1.65 Begin Typical C. Construct turnout left (see Typical).
- 1.80 Alternate Typical A & C as needed.
- 1.97 Construct turnout left (see Typical).
- 2.18 Maintain access road right (see Typical). Construct turnout left (see Typical).
- 2.20 Begin Typical D. Use left bank for material source for road widening. Minimum back slope of left bank is 1 1/2 to 1. Clear left bank 5 ft beyond top of slope.
- 2.40 Begin Typical B. Clearing is limited to 10 feet from each shoulder on these fills. Construct turnout right (see Typical).



- 2.55 Maintain access to left and right (see Typical). Begin Typical D.
- 2.61 Begin Typical A.
- 2.80 Alternate Typical A & B as needed
- 2.84 Construct turnout left (see Typical).
- 3.20 Maintain existing access right (see Typical).
- 3.31 Construct turnout left on existing landing.
- 3.43 Begin realignment of intersection.
- 3.48 Begin full double width of Typical end intersection.
- 3.49 Add turning radius width on both sides.
- 3.50 End of Project.

## STATE FOREST ROAD MANUAL

Solicitation No. 92-5

### FORM OF PROPOSAL FOR CONTRACT WORK

To Whom It May Concern:

The undersigned being familiar with the local conditions affecting the cost of the work and with these Contract Documents, Specifications, and Drawings (if any), hereby proposes to furnish all labor, materials, tools, transportation, equipment and all else necessary for the complete project described in the attached specifications and/or drawings and as itemized below:

#### IMPORTANT

THE FOLLOWING LISTED WORK ITEMS AND/OR QUANTITIES ARE APPROXIMATE AND ARE NOT CERTIFIED TO BE COMPLETE OR ACCURATE. PAYMENT WILL BE BY INVOICES SUBMITTED FOR WORK WHICH THE PROJECT SUPERVISOR HAS APPROVED AS COMPLETE.

All work must be completed Prior to : November 30, 1992

ITEM NO. DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	BID PER UNIT
1. Clearing and grubbing and shaping	990	lin. ft. _____	_____
2. Supply and install class 6 fabric (4 rolls 12 ft wide with laps)	9,500	sq. yd. _____	_____
3. Haul Fill and compact	7,500	cu. yds. _____	_____
4. Grading and compacting	1,770	lin. ft. _____	_____
5. Furnish & install culverts	84	lin. ft. _____	_____

# STATE FOREST ROAD MANUAL

- 2 - 21"x 15"x 42' arch type  
culverts with 4 aprons
- 1 - 42"x 29"x 42' arch type  
culvert with 2 aprons
- 42 lin. ft. \_\_\_\_\_
6. Fabricate and install  
double gate 1 pc. XXXXXXX \_\_\_\_\_
7. Seeding, fertilizing  
(Roadway & clearing) 1.6 acres \_\_\_\_\_

**TOTAL BID \$** \_\_\_\_\_

\_\_\_\_\_  
BIDDER'S SIGNATURE

All sales tax paid by contractor in securing product for this bid should be included as part of the bid. If any other sales tax is applicable as determined by the State, it will be added upon award of bid.

## STATE FOREST ROAD MANUAL

### MAINTENANCE - SAMPLE BID

#### GENERAL CONDITIONS

##### Grading Forest Roads

Bid No. 89-44

**GENERAL** - Work consists of grading approximately 90 miles of forest road.

**LOCATION** -The Two Inlets and Smokey Hills State Forests in Becker County and the Paul Bunyan State Forest in Hubbard County.

**CONTRACT ADMINISTRATOR** - Jack Bugge; DNR-Forestry, Park Rapids, Mn. 56470. Phone 218-732-3309.

**DATES** Grading is to be done from May 23, 1991 to October 15, 1991.

#### SPECIFICATIONS

##### Grading Forest Roads

Bid No. 89-44

#### SPECIFIC REQUIREMENTS

Contractor will:

1. Provide evidence of lease or title ownership of a road grader with a minimum of 80 h.p. and a grading blade of at least 12 feet.
2. Provide all maintenance, fuel, lubrication, repairs, and transportation needs required to keep the equipment in operation.
3. Provide a substitute road grader that will meet the minimum requirements in the event of equipment breakdown.

4. Make a sufficient number of passes to accomplish these specifications. Final grading must leave the road with a smooth, hard surface. Watering may be necessary.
5. Washboards must be completely removed by cutting them off below the bottom of the lowest part. Do not push the ridges into the dips.
6. No berms will be left along road edges. Road must drain into ditches.
7. The road crown shall be between 2% and 4%.
8. Sod should be removed from the center and edges of the road and rolled back and forth to remove any gravel it may contain.
9. Ditches must be cleaned and reshaped so water will drain properly.
10. All rocks over 2" diameter shall be removed from the road.
11. Roads must be left in a safe condition at the end of each day.
12. Immediately notify the Contract Administrator if unable to meet contract requirements.
13. Notify the Contract Administrator each time a round of grading is completed.
14. Provide a disk service recorder on grader.
15. Provide a weekly report showing hours and roads graded. Discs from a Service Recorder is required for payment.
16. Replace all marked culverts and signs damaged by grader.
17. Sign both ends of the project with the appropriate signs and flashers in accordance with the MUTCD (Manual of Uniform Traffic Control Devices). Move signs as necessary to reflect current work progress or hazards.

# STATE FOREST ROAD MANUAL

## GRADING SCHEDULE

The Contract Administrator may alter the grading schedule to meet maintenance needs according to road conditions. Roads will be graded according to the following schedule:

### **BECKER COUNTY**

<u>Road Name</u>	<u>Grade Every 5 weeks</u>
Wolf Lake	3.7 Miles
Hanna Ore	3.8 "
Smokey Hills	10.0 "
Indian Creek	4.5 "
So. Two Inlets	4.5 "
No. Two Inlets	4.7 "
Little Scenic	<u>7.0 "</u>
	38.2 Miles

### **HUBBARD COUNTY**

Akeley Cut-off	5.5 Miles
Steamboat	8.3 "
Thorpe tower	2.3 "
Spur I	7.4 "
Spur II	7.1 "
Blue Trail	1.0 "
Kabekona	3.0 "
Parkway	7.0 "
E. Steamboat	<u>6.7 "</u>
	48.3 Miles

### **HUBBARD COUNTY**

<u>Road Name</u>	<u>Grade Twice During Summer</u>
Waboose Access	.5 Miles
Mantrap Campground	1.0 "
Big Bass Lake	.3 "
Duck Lake Access	.8 "
Pickeral Lake Access	<u>1.3 "</u>

Approximate Mileage                      90.4 Miles

Total Grading Mileage                  440.3 Miles

This contract will be effective until October 15, 1991.

## **PAYMENT**

Bills should be submitted after each grading. The disks from the Service Recorder must be attached to the bills.

## **PERFORMANCE SECURITY and LIQUIDATED DAMAGES**

### Performance Security

A 5% performance security, as described in the SOLICITATION OF BIDS, is required of the successful bidder and must be submitted within 20 days of bid award. This security will be used in conformance with Mn. Statutes Sec. 574.26 through 574.264, which includes the additional costs of having another contractor complete the work if a default occurs, or to cover other obligations incurred by this contract.

### Liquidated Damages

If the completion dates are not met, damages will be assessed according to the schedule of Liquidated Damages in the SOLICITATION OF BIDS.

If work is not done according to the specifications, payment for those items will be withheld.

## STATE FOREST ROAD MANUAL

Solicitation No. 90-19

### FORM OF PROPOSAL FOR CONTRACT WORK

To Whom It May Concern:

The undersigned being familiar with the local conditions affecting the cost of the work and with these Contract Documents, Specifications, and Drawings (if any), hereby proposes to furnish all labor, materials, tools, transportation, equipment and all else necessary for the complete project described in the attached specifications and/or drawings and as itemized below:

#### IMPORTANT

THE FOLLOWING LISTED WORK ITEMS AND/OR QUANTITIES ARE APPROXIMATE AND ARE NOT CERTIFIED TO BE COMPLETE OR ACCURATE. PAYMENT WILL BE BY INVOICES SUBMITTED FOR WORK WHICH THE CONTRACT ADMINISTRATOR HAS APPROVED AS COMPLETE.

All work must be completed Prior to : October 15, 1991

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	BID PER UNIT	TOTAL
1.	Grade Forest Roads	320	Hours	_____	_____
2.	Watering (if necessary)	1,000	Gallons	_____	_____

There are approximately 440 miles of road grading in Hubbard and Becker counties, as listed in the specifications. An estimate of 1.5 miles per hour plus 20 hours for total number of hours needed to grade roads was used.

TOTAL BID \$ \_\_\_\_\_

\_\_\_\_\_  
BIDDER'S SIGNATURE

All sales tax paid by contractor in securing product for this bid should be included as part of the lump sum bid. If any other sales tax is applicable as determined by the State, it will be added upon award of bid.



## EXPLANATION OF BOE BID SECTIONS

### Div. 0 Bidding and Contract Documents

This section is mostly canned material which is taken from Operational Order 43. It contains the following items:

1. Title - Certification Page
2. Table of Contents
3. Advertisement for bids.
4. Instruction to Bidders  
(Bid security).
5. Form of Proposal for Contract Work  
(Performance security).
6. Related documents
7. Supplementary General Conditions of the Contract.

The only important items are:

Advertisement for bids  
Bid security  
Performance security

Items 4 to 7 are a modified Class II bid from Operational Order 43, and contain a lot of extraneous material that is very confusing. It is recommended to highlight pertinent information in items 3-5 and put a paper clip on the rest so it can easily be passed over.

### Div. 1 General Requirements

This section consists of Standard Specifications similar to ours, but the language makes it difficult to understand. It contains:

1. Special Conditions
2. Summary of Work
3. Regulatory Requirements
4. Measurement and Payment

5. Project Meetings  
(Pre-Bid and Pre-Construction)
6. Submittals
7. Construction Facilities and Temporary Controls
8. Contract Closeout

Items 4 & 5 are important and should be highlighted. The remainder can be clipped together and skipped over.

## **Div. 2 Sitework**

This section is significant as it contains detailed information relevant to the project and should be reviewed thoroughly when the draft proposal is received from BOE. Depending on the type of work called for, it will contain some or all of the following:

1. Site Preparation
2. Earthwork
3. Surfacing
4. Subsurface Investigation
5. Site Drainage

In a BOE contract the meaningful information is hidden amongst an abundance of canned material, making it difficult to find the useful data. It is suggested that important items be highlighted and non-important sections be clipped together so they can be easily passed over. It is very frustrating if a contractor calls about some item in a bid and you can not find it while he is waiting on the phone.

**STANDARD SPECIFICATIONS**

The GENERAL CONDITIONS sheet should always be used as a cover sheet for bids. All pertinent items are listed here.

**Mn DNR-DIVISION of FORESTRY  
GENERAL CONDITIONS**

\_\_\_ ROAD  
BID \_\_\_

**GENERAL**

Work consists of \_\_\_\_\_

**Location**

The project is in the \_\_\_\_\_ State Forest, \_\_\_ County, \_\_\_\_\_.

**Contract Administrator**

\_\_\_\_\_ ; DNR-Forestry, \_\_\_\_\_, MN. 56\_\_.

Phone 218-\_\_-\_\_.

**Dates**

All work must be done between \_\_\_\_\_, 19\_\_ and \_\_\_\_\_, 19\_\_.

**Pre-bid Meeting**

A pre-bid meeting will be held \_\_\_\_\_, 19\_\_ at \_\_\_ pm for showing the project to bidders. The meeting will be held at \_\_\_\_\_

**Preconstruction Meeting**

After the Executed File Copy of the Contract has been issued but before construction begins the Contract Administrator will advise the contractor of the time and place of the preconstruction

meeting.

### **Specifications**

The term MnDOT Spec. refers to the book of Specifications published by the Minnesota Department of Transportation.

These Standard Specifications will be superseded by Specific Requirements whenever the two sections do not agree.

### **CLEARING and GRUBBING**

Areas that will be excavated, filled, or designated will be cleared and grubbed. Clearing requires removing trees, brush, windfalls, and other vegetation. Grubbing requires removing stumps, roots, and other remains. The contractor shall be responsible for the removal and disposal of the resultant debris.

Timber may be purchased by the contractor or left for removal by the DNR. It must be cut in 100 inch lengths, separated by species, and piled by the road if not removed by contractor.

Merchantable timber may not be buried or disposed of as debris.

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Clearing and grubbing debris will be deposited in designated areas. These areas will be out of sight, not over 5 feet tall, and covered with dirt. Debris shall not be placed under the roadway or shoulder fills.

A burning permit must be obtained from the DNR if any material will be burned.

Clearing width will be a minimum of 10 feet horizontal from the shoulder of the road, or 5 feet beyond the top of the cut.

On existing fills greater than 15 feet in height the clearing shall be limited to 5 feet horizontal from the shoulder. Stumps shall be cut at or below ground level so they will not be uncovered by maintenance machinery.

### **EXCAVATION**

All excavation shall be to grades and slopes shown. This shall include any stripping of sod or topsoil, and cutting that may be necessary in the construction.

Any suitable material from the excavation may be used in the embankments. All other material shall be disposed of within the construction limits subject to the Contract Administrator's approval.

No unsuitable material shall be used in the subgrade construction.

If the contractor encounters unsuitable conditions, he shall notify the Contract Administrator and suspended work until instructed to proceed.

Topsoil shall be stripped and stockpiled for later use wherever there is sufficient depth to allow for later recovery of the material.

Any excess materials such as topsoil or earth fill not suitable for reuse shall be disposed of on site. The Contract Administrator will designate the disposal location.

## **EMBANKMENT AND FILL - SUBGRADE**

### **A. Preparation**

1. Unexcavated areas at which any embankment or fill is to be placed shall be cleared and grubbed. Excavated areas shall be free of refuse and debris.

### **B. Materials**

1. All embankment and fill material shall be select material and approved by the Contract Administrator prior to placement. Select material from the project excavation may be used if it is free of vegetable matter, stones over 6 inches, refuse and other debris.
2. No frozen material will be used in the placement of embankment or fill without written approval. If approved, frozen material may be placed on slopes and finished when it has thawed.
3. The Contract Administrator will locate borrow areas near the road for use as embankment.

C. Placement

1. For common excavation the slopes shall be as follows, or flatter:

Cut slopes 2:1

Fill Slopes 3:1 where fill heights are 5 feet or less.

Fill Slopes 2:1 where fill heights exceed 5 feet.

2. All embankment shall be layer placed according to MnDOT SPEC. 2105.3 and 2112. Allowable tolerances will be those listed in the specifications.

**GRADING AND COMPACTING - SUBGRADE**

Ordinary Compaction

The roadway embankment shall be constructed according to MnDOT SPEC 2112 for Subgrade Preparation. The "required density" shall be the density obtained by Ordinary Compaction, MnDOT SPEC 2105.3. The subgrade shall be constructed to the slope and cross-section shown (crowned 2-4%) for the finished project.

\* NOTE: This requires a vibratory or tamping (sheepsfoot) roller.

Specified Density

The upper three feet of the road shall meet MnDOT SPEC 2112 except "required density" shall be 90% of maximum density.

**GRADING - MAINTENANCE**

Washboards must be completely removed by cutting them off below the bottom of the lowest part. Do not push the ridges into the dips.

No berms will be left along road edges.

The road crown shall be between 2% and 4%.

Sod should be removed from the center and edges of the road and rolled back and forth to remove any gravel it may contain.

Ditches must be cleaned and reshaped so water will drain properly.

All rocks over 2" diameter shall be removed from the road.

Roads must be left in a safe condition after each day.

## **FINAL GRADING - SUBGRADE**

### Specifications

This shall include the work necessary to shape cuts and fills as shown. Surfaces must be smooth and uniform with slopes blended smoothly into the surrounding terrain. Depressions which can hold water will not be permitted in roads, ditches, or parking areas.

### Subgrade Approval

The Contract Administrator shall approve the subgrade prior to placement of surfacing material.

## **GRAVEL SURFACING**

### Spreading

Gravel shall be spread in layers 6 inches or less, according to MnDOT Spec. 2211, or as described in the Specific Requirements of this contract. Each layer shall be spread and compacted before spreading the next layer. The surface of each layer shall be maintained with uniform texture and firmly keyed particles. Continue until the next layer is spread, or until the completed base is accepted.

### Watering

If necessary, water shall be applied after three passes, or as directed by Contract Administrator, to aid compaction. A tank with pneumatic tired wheels and distributing bars or other apparatus to ensure uniform water distribution will be used.

### Compaction

The road shall be compacted according to MnDOT Spec. 2211.3C2, Ordinary Compaction. The gravel shall be thoroughly compacted with steel wheeled rollers and/or pneumatic tired rollers. All rolling equipment shall deliver at least 200 lbs. per lineal inch of rolling width. A minimum of six passes shall be made.

### Crowning

The finished surface shall be crowned or cross-sloped, according to drawings, to ensure adequate drainage and shall be smooth and continuous. Depressions which can hold water will not be permitted.

### Haul Roads

The contractor shall be responsible for maintaining the haul roads. He shall grade and return them to their original or better condition, so they are passable and free of ruts.

## **GRAVEL PITS**

### Existing Pit

Gravel for hauling will be obtained from the designated DNR pit or the contractor's own source.

### Development-New Pit

The contractor shall develop the designated DNR pit, crush, haul, and spread the gravel surfacing. Material will be mixed to prepare a uniform product. The pit will be worked in an orderly method.

Pit development includes stripping and stockpiling topsoil and overburden, construction of haul roads, and installation of crushing equipment. The natural surroundings of the pit shall be preserved as much as possible.



### Borings

The borings taken at this site only represent the materials found in the bored hole. The use of soil boring information will be at the contractor's own risk.

### Closeout

The natural surroundings of the pit shall be preserved as much as possible. The pit shall be sloped and backsloped so water will drain. It shall be left in a neat condition.

Clearing debris will be disposed of according to the CLEARING AND GRUBBING provisions. All materials from equipment maintenance, including drain oil, shall be collected and removed from the site.

## **GRAVEL CRUSHING**

### Specifications

Crushing shall include all work necessary to meet the requirements for Class \_\_ material according to MnDOT SPEC 3138, or as described below.

### Testing

The contractor shall prepare and submit representative samples to an approved testing laboratory. These samples will be taken as directed by the Contract Administrator. One gradation test shall be made from each pit for the first 500 cubic yards of material. An additional test will be made for each 3,000 cubic yards after that from each pit. A minimum of three tests are required. All testing shall be paid for by the contractor with two copies of the reports sent to the Contract Administrator.

### Fines

All crushing sites may require fine material added to meet specifications. This must be hauled from the designated sources.

### Measurement

Crushed material shall be measured in the stockpile by the DNR using the average end area cross section method. This material must be measured before removal. The contractor must provide a level surface for the base of the stock pile.

#### Stockpile

Enough material shall be crushed to make a \_\_ cubic yard stockpile.

#### Closeout

All materials from equipment maintenance, including drain oil, shall be collected and removed from the site.

### **SOIL STABILIZATION - FILTER FABRIC**

Filter fabric for embankment support shall be dimensionally stable. The fibers must maintain their relative position to each other and be free of chemical treatment or coating that may reduce porosity or permeability. They must be uniform in texture or appearance and free from defects or flaws that would effect their physical or filtering properties. During shipment and storage it shall be enclosed in a heavy duty covering to protect it from direct sunlight, high temperatures, and dirt. During construction it shall not be left exposed to sunlight for longer than 14 days. A strength loss of 10+ percent from unaged minimum average strengths, due to ultraviolet exposure, shall be grounds for rejection.

#### Installation Specifications

- A. Prior to placement, vegetation in the work area shall be flattened and cleared of obstructions that would tear or puncture the fabric. Grubbing will not be required unless directed. Degree of clearing shall be approved before installation of fabric. If damaged, it shall be totally repaired in conformance with these specifications and to the satisfaction of the Contract Administrator.

- B. Fabric shall be installed under the entire embankment from toe to toe, and riprap, unless otherwise specified. To speed construction, similar fabric may be used at locations other than specified above, but will be at contractor's expense.
- C. The fabric shall be placed with the highest strength direction (usually the "machine" or roll direction) oriented in the direction of greatest field stress. The seam will usually be at right angles to the centerline. If the fill is no more than 3 feet, another orientation may be approved. Placement shall be approved by the Contract Administrator.

Fabric strips shall be continuous with no seams in the high strength/machine direction, unless necessary to conserve fabric. All seams shall be factory or field sewn to meet 90% of the fabric strength shown in the table. Double sewing or "J" seams may be required. Broken or flawed seams shall be over sewn and loose thread ends securely knotted. Thread shall be of a type recommended by the manufacturer.

- D. The total embankment shall be constructed to minimize potential failure of the soil-fabric system. Unless otherwise specified, fill materials shall be placed in uniform layers not exceeding 6 inches.

When placing fill; two dikes, 8 feet wide and 18" high with 4:1 slopes shall be built along embankment edges. These "edge" dikes shall be built 40 feet ahead of the dike center section construction.

- E. A minimum of one foot of fill shall be placed on the fabric before traversing with any equipment. No wheeled or tracked vehicle shall operate directly on the fabric, except vehicles of less than 3 lbs./sq.in. may be required in building the first layer(s) of the embankment.

Unless required to raise the fill above water, the first full layer of fill shall not be more than 12 inches thick. Fill material shall be as specified. Fill rates or construction sequence may be modified during construction, based on field performance of the embankment.

The contractor shall furnish certified copies of the manufacturer's test results on fabric samples showing conformance to required specifications. These results, and a 6 x 6

## STATE FOREST ROAD MANUAL

foot sample, shall be furnished to the Contract Administrator for approval at least 60 days prior to intended use. (If the fabric has been approved for the intended application, a 30 day notification will be necessary. This will allow the Contract Administrator to verify the acceptability of the fabric.) Non-conforming fabric will be rejected. Approved fabrics will be accepted based on labeled brand names.

### FABRIC SPECIFICATIONS

Refer to MnDOT Spec. 3733. Generally our contracts should specify Type V fabric with 200 pound Grab Tensile Strength and seam breaking strength 90% of Grab Tensile Strength.

Type V fabric is less permeable than the other types (a higher permeability number means the fabric is more permeable.) The cost of Type V is about half that of Type II. Unless there are special reasons for using a highly permeable fabric, Type V should always be specified.

### **SLOPE PROTECTION AND EROSION CONTROL**

Drainage shall be as specified. Any additional ditching to resolve drainage problems or stop erosion caused by this project shall be done by the contractor and considered incidental. The Contract Administrator shall decide if this work is necessary. This may include erection of silt fences adjoining water.

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### **SITE DRAINAGE**

#### **DITCHES**

The ditch dimensions shown are minimums. They may have to be increased to provide adequate drainage or to allow the minimum 12 inch subgrade cover on culverts.

#### **CULVERTS**

##### Steel and Aluminum

Steel and aluminum pipe, connecting bands, and aprons shall be the size, gauge, and length specified. They shall conform to MnDOT SPEC 3226 and 3225. Steel pipe shall be galvanized

according to MnDOT SPEC 3392 and 3394. Connecting bands shall be a minimum of two feet in length and a minimum of 16 gauge, or up to 2 gauges lighter than pipe, whichever is heaviest.

All corrugated pipe (annular or spiral corrugated) shall have annular corrugated ends.

### Plastic

Plastic pipe shall be the length specified and meet MnDOT Spec. 3245, 3247 or 3278. The connecting bands (mechanism) shall be those recommended by the manufacturer and hold adjoining sections in a secure, watertight manner.

### Installation

The pipe shall be installed as specified, and laid according to MnDOT SPEC 2501. Bedding shall be Class C as outlined in MnDOT SPEC 2451. Culvert shall have a camber of 1-2 inches and drain from inlet to outlet.

Backfill on both sides of the pipe shall be tamped simultaneously. Space between pipes in a multiple culvert should be half the pipe diameter. Also, fill over pipes should be half the culvert diameter, but not less than 1 foot of subgrade.

Select fill shall be used that is free of stones over 2 inches, large lumps or clods, and organic matter. It shall be placed in layers not over 6 inches uncompacted thickness. Each layer shall be compacted according to contract specifications for embankment compacting. Special care shall be taken to compact under the pipe.

Until the pipe is covered to a depth of 2 feet, earth moving equipment will not be permitted to operate over it.

Prior to final acceptance, all culverts shall be cleared of debris.

## **WATER HANDLING**

The contractor shall provide means of bypassing water around or through the project site without creating unnatural conditions in lakes or streams, or damaging property. He shall save the State harmless from claims of any nature arising from his work. A written release of any claims will be

provided before the DNR makes final payment. He shall dewater as necessary to meet the requirements of these specifications.

## **DEWATERING**

Dewatering shall be done so the pipe can be placed on a firm, dry foundation. Dewatering shall continue until the pipe is covered with back fill material.

## **TURF ESTABLISHMENT**

Turf shall be established by topsoiling, fertilizing, seeding, mulching, and watering in according to specifications.

The Contract Administrator may approve alternative methods of turf establishment if they will produce essentially the same results as the specified method.

Topsoiling is dependent on available quantity from the stripping and stockpiling operation.

Turf shall be established between April 1 and September 15, and as dormant seeding after November 1. No planting will be allowed from September 15 to November 1.

## **TURF INSTALLATION**

### **A. Soil Preparation**

Final grading will be done prior to topsoiling. Topsoil shall be spread loosely and uniformly over the final grade. The surface shall be smooth and uniform with no rocks, sticks, or other foreign material present.

### **B. Topsoil**

Only clean friable surface soil shall be used. If contractor does not save topsoil it must be replaced at his expense. Otherwise, no topsoil shall be hauled in from an outside source.

### **C. Fertilizer**

Fertilizer shall be applied at the rate of 5 pounds per thousand square feet (220 lb./acre.) It shall be a 12-12-12 commercial grade consisting of the following proportions:

Total nitrogen	12%
Available phosphoric acid	12%
Water soluble potash	12%

**SEEDING**

A. Seed

Seed shall be a uniform mixture according to the MnDOT Spec. 3876. This is commonly called Mixture # 600 (plus 25 lbs. oats). This must contain the following varieties proportional by weight as specified below:

<u>Common Seed Name</u>	<u>Percent in Mixture</u>	<u>Minimum Pounds</u>	<u>Purity</u>	<u>Percent Germination</u>
Park Kentucky				
Bluegrass	40%	40	95%	82%
Red Fescue	20%	20	97%	85%
Red Top	3%	3	92%	85%
Perennial Rye grass	10%	10	99%	92%
Dutch White Clover	2%	2	99%	85%
Oats	<u>25%</u>	<u>25</u>	99%	85%
	100%	100 lbs.		

This seed mixture shall be sown at the rate of 100 lbs./acre.

All seed shall conform to the requirements of the latest seed laws of the State of Minnesota, including those governing weed seed tolerances. The contractor shall supply the Contract Administrator with a certification of the seed mixture.

B. Installation

## STATE FOREST ROAD MANUAL

Seed shall be drilled or broadcast immediately after soil preparation.

### C. Mulch

Mulch shall be applied immediately after seeding. Use Type I, MnDOT SPEC 3882 straw that is free of noxious grass or weed seeds. This type of straw is defined by the rules and regulations of the Minnesota Department of Agriculture. It must be applied at 2 tons per acre and watered sufficiently to soak the upper 1.5 inches. Erosion or washing will not be allowed.

### D. Maintenance

Maintenance shall begin when seeding starts and continue to final acceptance. Maintenance consists of:

Watering

Weeding

Replacement of topsoil, seed, and mulch to eroded areas.

### GUARANTEE AND REPLACEMENT - SEED

The contractor shall guarantee a uniform stand of grass for 1 year from date of final payment request. If there is a lack of grass cover during this period the contractor will reestablish the turf using the same procedures as required for original establishment. This work will be done with no additional cost to the DNR.

### **FENCES, BARRICADES, AND SIGNS**

The contractor shall build and maintain fences and barricades whenever necessary to provide public protection. He shall operate and maintain proper lights and signs that meet MUTCD (Manual of Uniform Traffic Control Devices) standards. All warning devices shall be removed by the contractor when work is completed.

### **WORK WITHIN COUNTY AND TOWNSHIP R/W**



The contractor shall observe all rules and regulations of the county and township. He shall notify the County Engineer and/or Township Supervisor at least five working days before starting work.

## **CONTRACT CLOSEOUT**

### CLEANUP

The contractor shall remove and legally dispose of rubbish and debris resulting from his work. This shall be done before equipment is removed from the site. The area must be left in a clean and presentable condition

### MAINTENANCE

The contractor will maintain all finished work until final acceptance by the Contract Administrator. All expenses for this maintenance shall be borne by him.

### ARCHAEOLOGY

Work will stop if archaeological remains are discovered. The Contract Administrator will be immediately notified of these findings.

### REMOVAL ITEMS

The contractor shall dispose of items to be removed except those the DNR wants to retain. Care shall be taken in removing these items.

## **MEASUREMENTS**

Bids will awarded to the lowest TOTAL BID and should include labor, equipment, and materials (if specified).

Measurement for adjustments shall be made in according to the units of measure on BID SHEET.

Measurement for payment of fill and surfacing will be made by sampling in place thickness.

## **PERFORMANCE SECURITY and LIQUIDATED DAMAGES**

### Performance Security

The performance security will be used in conformance with Mn. Statutes Sec. 574.26 through 574.264. This includes additional costs of having another contractor complete work if a default occurs, or to cover other obligations incurred by this contract.

### Liquidated Damages

If work is not completed on time, damages will be assessed according to the schedule of Liquidated Damages in the SOLICITATION OF BIDS. If work is not performed according to specifications, payment for those items will be withheld.

### Rational for Requirements of Securities

There are many items to consider when deciding the amount of securities to require. The Bureau of Engineering requires 100% on all bids, but this is usually not necessary or practical for Forestry projects. Although a bid security is not as important as a performance security, it should be required if time restraints would make it difficult to re-let if low bidder defaults. If you do require a bid security, it is recommended that it is the same percentage as the performance security. Items that should be considered for amount of performance security are:

1. Location of Project. It will be expensive to have a second contractor move in to finish a partially completed project on an isolated site.
2. Geographic Area. If a bid covers a large area, such as brushing or grading, it may cost more to have a second contractor complete the work.
3. Long Seasonal Contracts. If a seasonal contractor, such as summer grading, defaults in the middle of the season it may be difficult or impossible to obtain another contractor. They may have all the work they can handle this late in the year.

## **CONTRACT ADMINISTRATION**

### **SUPPLEMENTAL AGREEMENTS**

Whenever the contractor and the Contract Administrator agree to a change in the contract (either an increase or decrease of work) it should be documented in writing. BOE uses the "SUPPLEMENTAL AGREEMENT CONSTRUCTION CONTRACTS," Admin Form 908 (10-73) for all work changes. Also, this form can be used by DNR. The Contract Administrator is the only person who can make a supplemental agreement.

## INSPECTIONS

For DNR contracts we are solely responsible for work done to our specifications. Therefore, the Contract Administrator should always be thoroughly familiar with what the contractor is doing. This will usually require at least one visit daily. For BOE contracts the Region Engineer will usually be responsible for inspections. We still must make enough site visits to insure that work is done the way we want. **CONTRACT ADMINISTRATION - CONSTRUCTION**

The word "construction" within the Division's Forest Road Program means:

Construction of entirely new forest roads and bridges or major water-crossings.

Reconstruction of existing roads where the road class will be changed.

Contractual work on existing roads (grading, R.O.W. maintenance, clearing, water-crossings, road maintenance and culvert replacement) will be categorized as road maintenance.

The construction phase begins when the goals in the project proposal are put into the design plans. Then a specific contract is written, bid, and construction work begun.

The construction phase of the State Forest Road program is guided by three types of supervision:

1. Project Inspection
2. Contract Administration
3. Contract and Project Enforcement

Activities that occur during the construction phase directly impact the long term maintenance program. Errors may be made during design and during actual construction. These mistakes will

show up when the road or water crossing is used, and result in needless use of maintenance funds to correct problems that could have been avoided during construction.

All major construction and reconstruction contracts should be reviewed at a preconstruction meeting between the contractor and contract administrator/designer. This meeting should be held at the project site before construction begins. The main objective is to review all contract completion requirements, item by item, so the contractor has a clear understanding of the contract and project goals.

Construction activity will vary according to the type of bid. A small Class I bid may be designed, written and managed by the field Forester. A major contract will probably be written, designed and managed by the Bureau of Engineering. The size of the contract is not a sign of the importance of sound contract specifications.

The following general guidelines will apply on all types of contracts involving Division of Forestry personnel. When we are asked to assist B.O.E. with a contract, the Engineer's guidelines shall apply. Forestry personnel will also assist with any other administrative items B.O.E. requests.

#### 1. PROJECT INSPECTION - CONSTRUCTION

To achieve satisfactory results, the first requirement is a regular schedule of project inspections. These must occur while construction is in progress. The number and length of inspections may vary, depending on the type of work and the integrity and knowledge of the contractor. Daily visits are recommended while the contractor is working. A copy of the specifications should always be carried when visiting the site.

The project administrator or inspector should use their own judgment about the number and length of inspections. It is better to visit the project too frequently than not enough. Infrequent visits may result in performance deficiency.

On B.O.E. designed contracts, a field representative may be contacted to inspect a project on the Engineer's behalf. These inspections should be coordinated with the engineer. All records of these visits and contacts with the contractor should be given to the Regional Engineer. B.O.E. administered contracts should be visited at least three times a week.

An inspection report for forestry designed projects should be completed after each visit and placed in the project file for later use. Our Division has no formal procedure for this inspection report. A simple handwritten record of the operation on a specific date or time is helpful, and should be used. The Field Inspection Report form, found later in this section can be used. If construction problems are found and noted, the contractor should be notified verbally or with the field report.

## 2. CONTRACT ADMINISTRATION - CONSTRUCTION

Contract administration begins when the inspection ends. Inspectors' shall make sure all legal and technical parts of the contract are followed. Whether the project was designed by the B.O.E. or Division personnel, the inspector or administrator shall familiarize himself with all requirements. This will insure that they are followed.

Some items which may need attention in a construction contract are:

- A. Clearing and Grubbing: Width and disposal.
- B. Culverts: Length, gauge, placement, underlayment, compaction, depth and other installation requirements.
- C. Surfacing Material: Granular Compliance, volumes and depth.
- D. Road Surface: Crown compaction, drainage and crown slope.
- E. Ditching: Slope, drainage, cleanliness, depth, width and berm disposal.
- F. Subgrade: Width, compaction, grade and pre grade preparations.
- G. Gravel and Borrow Pits: Pre-work site preparation, cleanup, pit rehabilitation and dressing.
- H. Right of Way: Debris free? Seeding and/or mulching requirements.
- I. Gates and Signing: Placement, location and need.

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J. Grading and Compacting: Watering, crown, equipment and method.

### 3. CHANGES - CONTRACT AMENDMENTS.

During construction, frequent changes may need to be made to the contract. These are usually made to furnish better materials or construction work, or to get an improved road or bridge. Supplemental Agreements can be made to an existing contract between the DNR and the contractor. These should be based on the unit bid rates from the original bid sheet. If the changes are different from those listed in the contract, a price must be negotiated with the contractor. The project administrator must insure adequate funds are available to cover any additions.

### 4. CONTRACT AND PROJECT ENFORCEMENT.

Sometimes corrective action is necessary when work is not being done to specifications, or within the prescribed time frame. The contract administrator has two enforcement tools that can be used to properly complete the project:

1. Withholding payment (partial or all)
2. The performance bond.

The Schedule of Liquidated Damages in THE SOLICITATION OF BIDS should be used to insure work is completed on time. Charges will be based on the time spent between the contract end date and actual completion date. The Attorney General's Office has said that damages resulting from late completion must be real and actual. Financial loss must be shown within the contract records if we are to enforce liquidated damage fees. Liquidated damages are used when a contract is almost finished.

A contract that has not been started, or never will be completed, requires use of the performance bond. The additional cost of going to the next lowest bidder can only be assessed against the bond. It is very important that we are consistent in contract enforcement. A vendor should never be allowed to develop routine work performance that is less than what we will accept. A performance evaluation should be completed, on the following field report, where deadlines or specifications were not met. This form should be given to the Business Manager or contracting agent. He will also inform other Divisions and the bonding company. Make certain all facts are sound and factual.

ROAD PROJECT INSPECTION REPORT

DATE:		CONTRACT #:				PROJECT:		
WEATHER:		CONTRACTOR:				INSPECTOR:		
WORK ITEM	UNITS	CONTRACT - QUANTITY	LAST INSPECT	ACCOMP. TO DATE	ACCOMP. FOR PERIOD	PERCENT COMPLETE	PAYMENT APPROVED	COMMENTS
CLEARING	Fall/Brush							
	Skidding							
	Grubbing							
	Disposal							
	Sub Total							
EARTHWORK	Common							
	Till							
	Ditches							
BACKSLOPES								
FABRIC								
BORROW VOL.	Haul Distance							
COMPACTING								
FINISHING								
Sub. Total								
DRAIN STRUCT.	___" CMP							
	___" CMP							
Sub. Total								
SUPPLY CMP								
REMOVE CMP								
Sub. Total								
GRAVEL								
GRAVEL CRUSH								
SURFACING								
HAUL DIST.								
Sub. Total								
VEGETATION	Estab.							
Sub. Total								
MOBILIZATION	Ovrhd.							
	Insurance							
	Move In/Out							
	Down Time							
Sub. Total								
GRAND TOTAL								

ROAD BID CHECK LIST

Project \_\_\_\_\_

**Grub and Clear**

Length of work \_\_\_\_\_ mi.

Width of work \_\_\_\_\_ ft.

**Shape, Grade & Compact-Sub-grade**

Length of work \_\_\_\_\_ mi.

Length of work \_\_\_\_\_ mi.

Width of work \_\_\_\_\_ ft.

**Fill**

Length of work \_\_\_\_\_ mi.

Width of work \_\_\_\_\_ ft.

Depth \_\_\_\_\_ in.

Cu. Yards (compacted) \_\_\_\_\_

Pit Location \_\_\_\_\_

DNR/Contractor provide (circle)

Distance to Project \_\_\_\_\_ mi.

Measurement \_\_\_\_\_

**Surfacing**

Length of work \_\_\_\_\_ mi.

Width of work \_\_\_\_\_ ft.

Depth \_\_\_\_\_ in.

Cu. Yds. (compacted) \_\_\_\_\_

Pit Location \_\_\_\_\_

Distance to project \_\_\_\_\_ mi.

Measurement \_\_\_\_\_

**Crushing**

Pit Location \_\_\_\_\_

Cu. Yds. \_\_\_\_\_

Measurement \_\_\_\_\_

**Ditches**

Backslope \_\_\_\_\_

Inslope \_\_\_\_\_

Typical \_\_\_\_\_

**Culverts**

Length of work \_\_\_\_\_ mi.

Size and Number \_\_\_\_\_

DNR or Contractor to provide (circle)

Steel (3226, 3392, 3394) \_\_\_\_\_

Aluminum (3225) \_\_\_\_\_

Plastic \_\_\_\_\_

**Turnouts**

Length \_\_\_\_\_

Width \_\_\_\_\_

Taper \_\_\_\_\_

Typicals \_\_\_\_\_

Fill Source \_\_\_\_\_

**Map**

**Fabric**

Sq. Yards \_\_\_\_\_

DNR or Contractor to provide (circle)

Type VI fabric with 200 pound grab tensile strength and seam breaking strength 90% of grab tensile strength

**Grading**

No. of Passes \_\_\_\_\_

Eliminate shoulder ridge \_\_\_\_\_

No berm in road at end of day \_\_\_\_\_

Service Recorder Disk \_\_\_\_\_

Replace damaged signs and culverts \_\_\_\_\_







**L. SIGNING**

## FOREST ROAD SIGNS

### General Policy

The purpose of signing a road is to give warning and guidance to the user. The Division's use of signs will be limited when compared to state, county and township roads. They must still be consistently placed to warn of unexpected changes in the roadway and to furnish information. The problem we face is the wide range of forest road types. They range from little more than improved skid trails to those that function like high speed county roads.

The term "positive guidance" is used by road authorities when considering the need and placement of signs. It means hazard warnings must be provided wherever a driver cannot see the hazard in time to react safely. Obviously, reaction time is different at 20 mph than 55 mph. A 35 mph road needs more warning signs than a 15 mph road.

The decision to install a sign will usually be made by the Area Forester or his designated road specialist, although all road users may make suggestions. Because protecting users against unexpected changes is a major function of road signs, we must not allow our familiarity with a road to cloud our perception of potential safety problems. Because we know the road ends, or a narrow bridge is just around the corner, the danger may not be apparent to us. Similarly, we might overlook a needed informational sign because we are too familiar with the area.

Public road authorities use "The Manual of Uniform Traffic Control Devices" (MUTCD) to determine signing needs. It defines the exact sign placement in terms of sight distance and prevailing speeds for public roads. Because the Division of Forestry is not a "road authority" and our roads are not public roads, we will not apply MUTCD verbatim to all state forest roads. It is a good reference when in doubt about sign placement. County highway departments and St. Paul road staff will have copies of this manual. This chapter on signs draws upon information in the MUTCD.

### General Sign Placement

Proper location of each sign is essential to obtain maximum visibility and effectiveness. Prevailing approach speed, topography, and vegetation will affect sign placement. Avoid placing signs in dips, beyond hill crest or other places where they can not be seen in time to allow safe reaction. Avoid situations where vegetation will quickly obscure them and become a continual maintenance problem.

### Lateral Placement

Locate signs on the right-hand side of the roadway. When conditions permit, they should have a lateral clearance at least twelve feet between the roadway edge and the near edge of the sign. When size of the cleared right-of-way or topography prevents such placement, locate the sign as far from the roadway as possible.

### Height

All traffic signs must be high enough to be easily seen by approaching motorists. The national standard is seven feet between the road surface and the bottom of the sign. At locations where the sign will interfere with pedestrians, or be obscured by parked vehicles or vegetation, the minimum height may be reduced to five feet.

### Advanced Posting Distance

Advance posting distance is determined by the prevailing approach speed and the time required to respond. For purposes of determining advance posting distance, each highway warning sign is placed in one of four categories. The text accompanying each sign will specify its category and the following charts (page L - 8) show the appropriate advance posting distance.

### Sign Specifications

Sign size is illustrated in the following pages along with a description of its use. When the desired sign is not shown here, consult the MUTCD manual for required size. The Regional Specialists or Division Road Coordinator has copies of the manual. Miniature signs used on snowmobile trails should not be used on forest roads, only full size reflective signs. Traffic sign colors have been standardized for several years. They are as follows:

Red - stop or prohibition

Orange - construction and maintenance warning

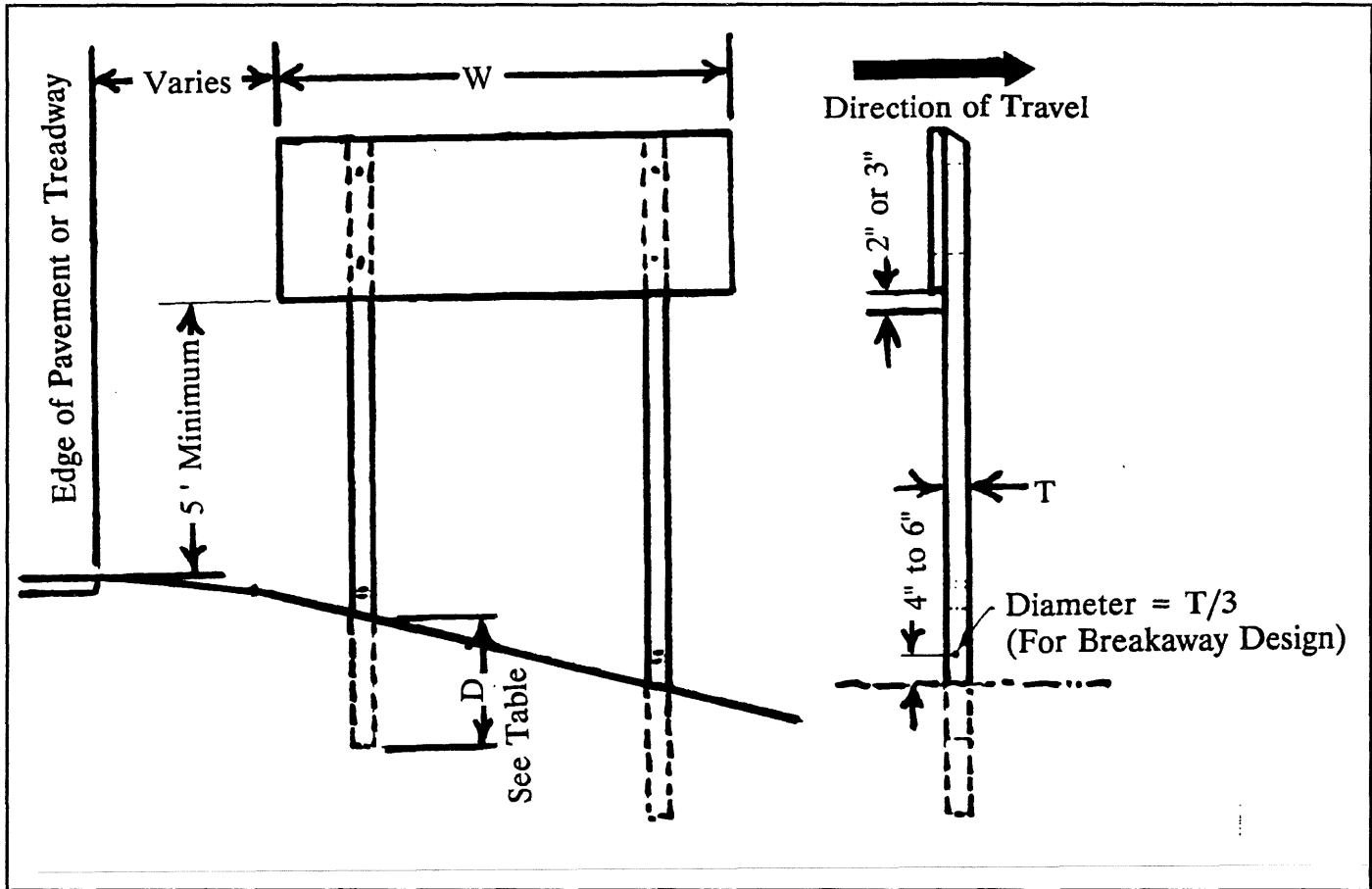
Green - direction guidance

Yellow - general warning

Blue - motorist services guidance

Brown - recreational and cultural interest guidance

WOODEN BREAKAWAY SIGN SUPPORT GUIDELINES



W = Width of sign

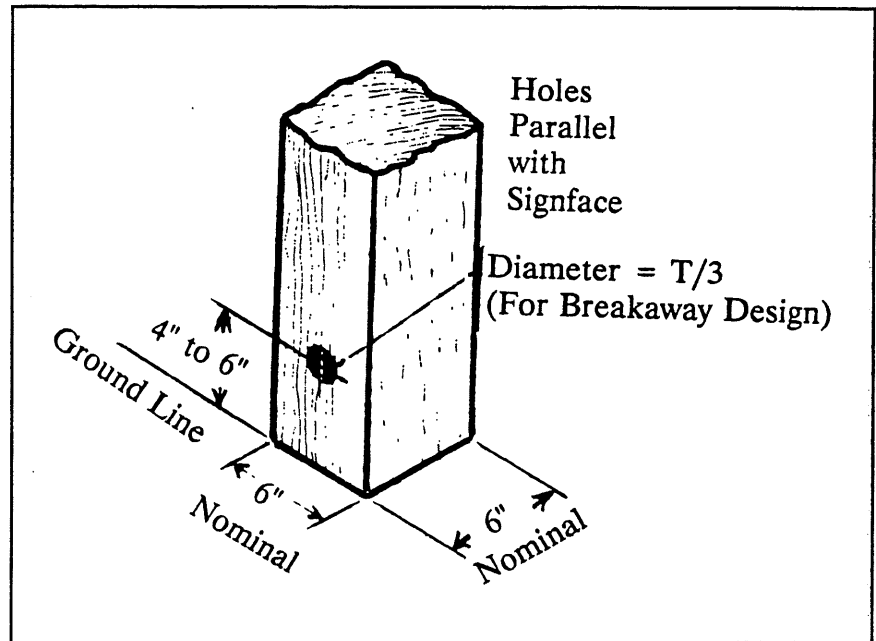
T = Thickness of sign support

D = Depth setting in ground

Double Support - Use two posts to support a sign when it is wider than 36" or has more than 10 square feet of surface area.

**TYPICAL BREAKAWAY  
 SUPPORT**

Reducing Shear Resistance Without  
 Substantial Loss Of Capacity To  
 Withstand Wind Loading



Breakaway Design Post Sizes

Post size	"D" min.	Maximum Sign Area (sq. ft)			
		Single post	Double post	Triple post	Quadruple post
4" X 4"	3'	10*	20		
4" X 6"	4'	15*	35	45	
6" X 6"	4'	20**	50	75	100

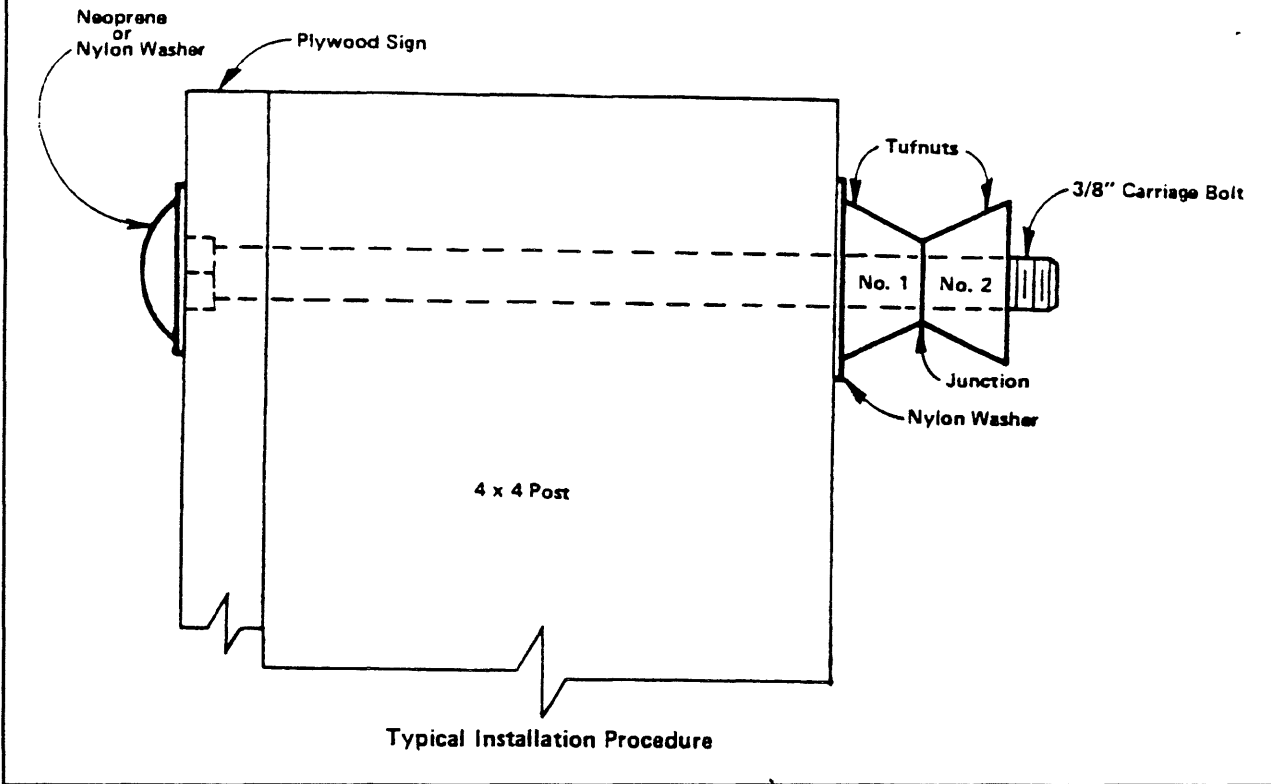
\* Use two 4" X 4" posts if W is over 3'.

\*\* Use two 4" X 4" posts if W is over 4'.

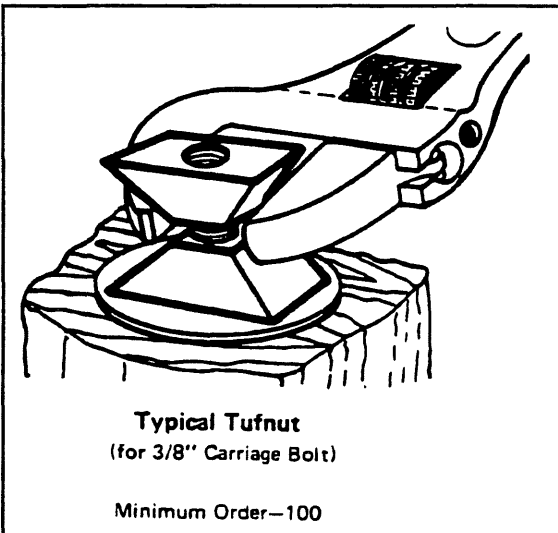
Breakaway design is required for all posts (new and existing) with cross sectional area greater than 24 square inches. Uses drilled hole at bottom of support only. Field drill posts and treat hole with preservative.

Sign Installation Hardware "Tufnut" (Pyramidal nuts) Anti-theft, Anti-vandal Fasteners Typical Installation Procedure

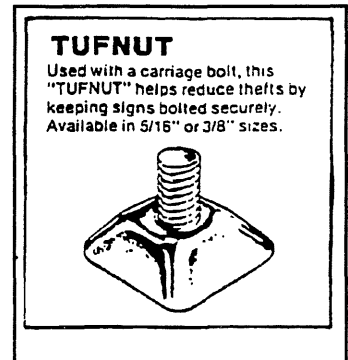
**Sign Installation Hardware  
"Tufnut" (Pyramidal nuts)  
Anti-theft, Anti-vandal Fasteners**



- Step 1: Install first Tufnut (No. 1) finger tighten as shown.
- Step 2: Install second Tufnut (No. 2) finger tighten as shown.
- Step 3: Insert wrench at junction to tighten (or loosen) as necessary.
- Step 4: Remove Tufnut No. 2, then installation is complete.



Single Tufnut is difficult to remove because of its shape. Always use 4 Tufnuts for two post sign installation.





**ADVANCE POSTING DISTANCE BY SIGN CATEGORY**

Signs in Category I warn of conditions which require, or may require, the driver to stop. Examples of signs in this category are stop ahead and intersection signs.

Signs in Category II warn of conditions which normally require a driver to reduce speed. Example of signs in this category are curve, hill and rough road.

Signs in Category III warn of conditions which may require an unexpected driving maneuver, or of which the motorist should be generally aware. Examples of signs in this category are low shoulder and narrow bridge signs.

Posting Category IV is for signs which do not fit within any of the other three categories. Double arrow, and dead-end signs are in this category.

ADVANCE POSTING DISTANCE IN FEET											
Category I											
Prevailing Speed (miles per hour)	20	25	30	35	40	45	50	55	60		
Advance Posting Distance (feet)	200	260	355	450	545	640	735	830	920		
Category II											
PREVAILING APPROACH ADVISORY SPEED FOR CONDITION SPEED (MILES PER HOUR)	5	10	15	20	25	30	35	40	45	50	55
20	200	200	200	200	200						
25	245	200	200	200	200	200					
30	340	290	210	200	200	200	200				
35	435	390	315	240	200	200	200	200			
40	530	490	420	350	270	200	200	200	200		
45	625	585	525	480	385	300	205	200	200	200	
50	720	685	630	570	500	420	330	290	200	200	200
55	815	785	735	680	615	540	455	360	255	200	200
60	910	885	840	790	730	660	580	490	390	280	200
Category III											
Prevailing Speed (miles per hour)	20	20	30	35	40	45	50	55	60		
Advance Posting Distance (feet)	200	200	210	240	270	300	300	360	390		

Values should be used as guides in determining advance posting distances for signs in Categories I, II and III. These values are suggested advance posting distances on essentially level approaches for various approach speeds and, for posting Category II signs, for various advisory speeds. These values should be increased on downgrade approaches to accommodate the greater deceleration distances involved. On steep upgrades, the values may be decreased.

For signs in posting Category IV, sign location information is in the text accompanying the signs.

**PREVAILING SPEED.** The speed at, or below which, vehicles generally travel at a particular location under optimum condition.

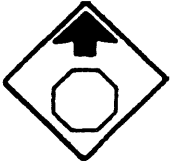
## SAFETY SIGNS (PERMANENT)



**30" X 30"**

Application: Use on Class III or better roads that intersect high speed public roads or on any road where lack of line of sight creates a hazard when crossing or entering the intersecting road.

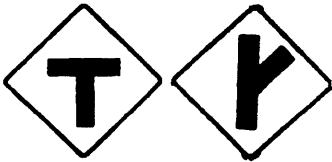
Location: The stop sign should be placed as near as possible to the point where the vehicles are to stop and no more than twenty (20) feet from the intersecting roadway.



**30" X 30"**

Application: Generally not needed except when a stop sign will not be visible in sufficient time to stop at the prevailing roadway speed.

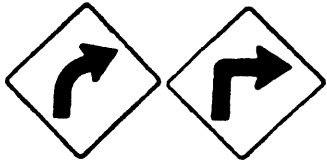
Location: Category I (see chart page L - 8)



**30" X 30"**

Application: These signs are for use to warn traffic on the approach of an important intersection which is not visible to approaching traffic. Do not use in place of STOP AHEAD sign.

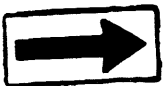
Location: Category I (see chart page L - 8).



**30" X 30"**

Application: When a curve is severe enough to require a reduction in speed and unexpected, as after a long straight away these signs are appropriate warning.

Location: Category II (see chart page L - 8).



**48" X 24"**

Application: This sign is for use to warn that traffic must turn either left or right. This sign may be used at a "T" intersection, where the road forming the top of the "T" is two-way.

Location: This sign is in category IV. Where used, it should be placed on the far side of the "T" intersection, in line with and facing, traffic approaching on the stem.



12" x 36"

Application: (Type III Object Marker). Used to mark obstructions that are close to the roadway such as bridges or guardrails.

Location: Should be attached to or directly in front of the obstruction that is being marked. The dark stripes should slope downward toward the roadway.



24' x 30"

Application: This sign is used to indicate the safe capacity of a bridge or elevated structure as determined by an engineering inspection.

Location: Place immediately in advance of the structure.



36" x 36"

Application : Use on Class III or better roads, where the roadway over a bridge or culvert is less than 16 feet wide. This sign may be appropriate on a lower grade road where there is little or warning of a single lane ahead.

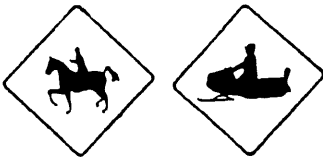
Location: Category I (see chart page L - 8) measured from the end of the bridge.



36"

Application: Required for all railroad crossings unless MNDOT authorized the omission of the sign.

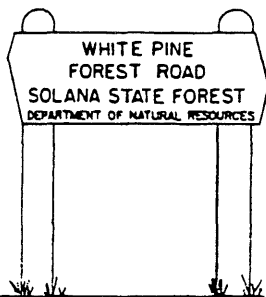
Location: Category I (see chart page L - 8) measured from the nearest rail. The railroad is responsible for the actual crossing sign.



30" X 30"

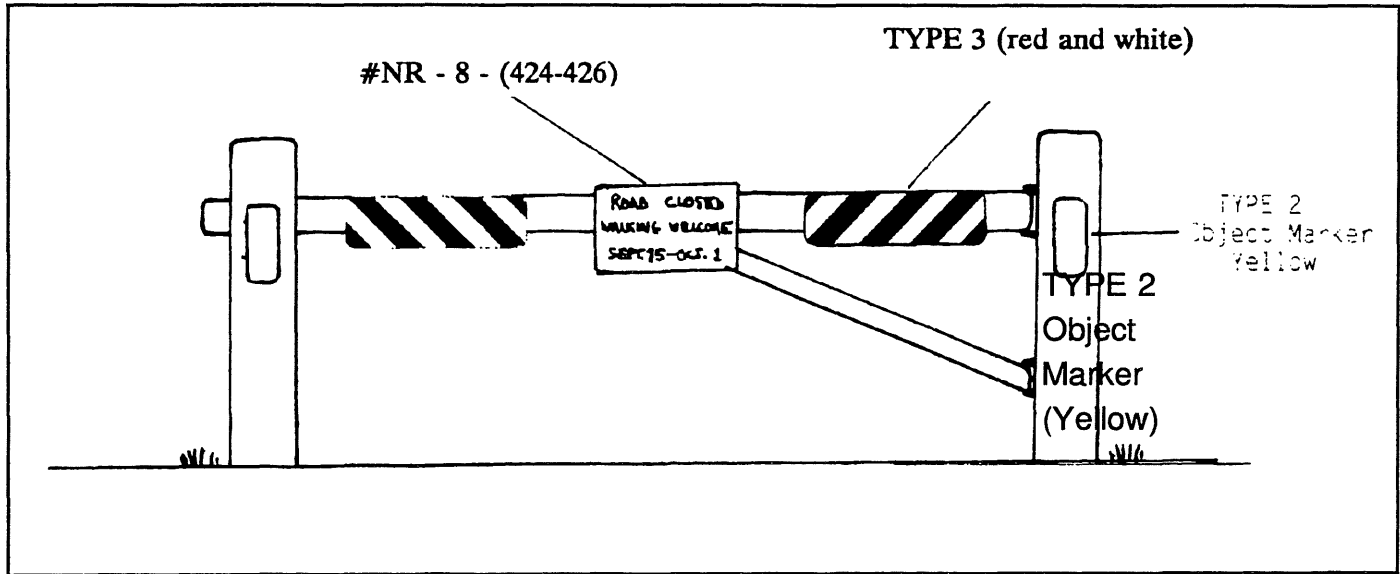
Application: Warning of major trails crossing the roadway where sight distances are limited and can't be improved.

Location: Category I (see chart page L - 8).



Wood routed and silk screened signs placed along state forest roads should follow design and placement guidelines given in the Departments sign manual. Section 7.2 has information on letter size and sign height.

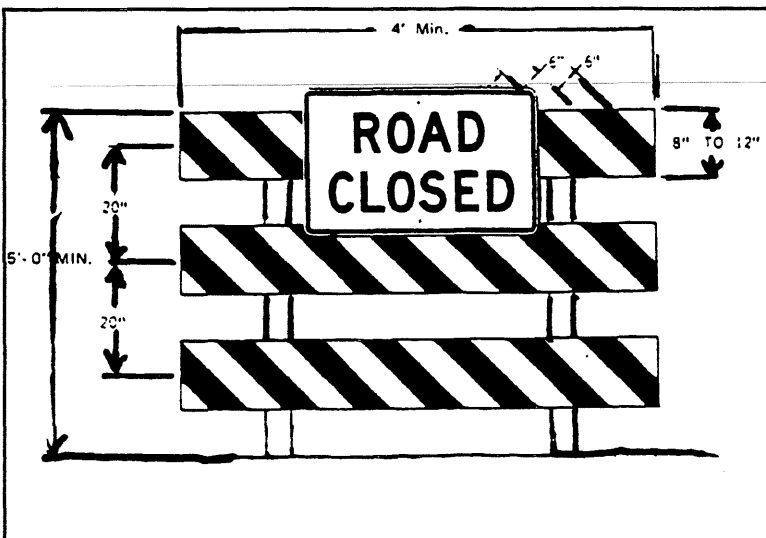
# STATE FOREST ROAD MANUAL



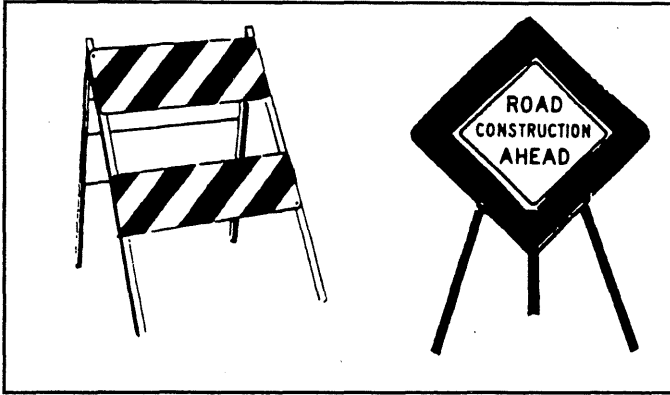
## GATE SIGNING

**NOTE:** If the gate has a post to support it when it is open, don't forget to also place a Type 2 (Yellow) Object Marker on it.

## SAFETY SIGNS (TEMPORARY)



Application: This Type III barricade is used during a major reconstruction or an emergency such as a washout or damaged bridge. With a different sign, the barricade may be used to draw attention to a road condition ahead, such as construction.



Application: Use these Type I or II barricades or other types of warning markers during road maintenance such as grading or re-graveling operations.

Reflective Tape: Applying solid or striped reflective tape to gate members or barricades is cheaper than using aluminum blank object markers. Most sign suppliers sell this tape in 6" or 8" widths, considerably cheaper than small amounts at a local

hardware store.

#### Maintenance Policy

It will be the responsibility of the Area Road Specialist to insure all necessary signs are installed and maintained in a serviceable condition. The Area Forester will depend upon field personnel advising them of needed sign maintenance. A listing of sign types and location needs will be maintained at the area level to assist in maintenance. Replacement of severely damaged signs, and vegetation control is the primary maintenance needs. It should be a high priority to regularly accomplish needed maintenance on traffic and other signs.

When to replace a damaged sign is a judgment call by the field forester. One bullet hole is not likely to require sign replacement. Signs without lettering will likely need less replacement. A missing warning sign, such as a STOP sign, needs replacing as soon as possible. Damaged, but still legible, curve signs might be combined with other signs in need of replacement and done as an area or regional contract. Each area should develop their own system of collecting sign maintenance needs and replacing or repairing them.

The Area Forestry Office should maintain a supply of signs and posts. The cost of signs can be included in the annual road budget and purchased by the area, or needs can be pooled and purchased on a regional order.

SOURCES OF SIGNS

- MN DOT District            Full line of signs available at "cost".  
Offices Sign Shops
- County Highway Shops    Generally, willing suppliers of signs.
- M&R Sign                 Commercial supplier full line of signs and barricades.  
Industrial Park Blvd.  
Fergus Falls, MN 56537  
(218)736-5681
- Earl F. Anderson           Commercial supplier full line of signs and barricades  
9808 Jane Circle  
Bloomington, MN 55431  
(612)884-7300
- Newman Signs             Commercial supplier full line of signs and barricades.  
Business Loop West, P.O. Box 1726  
Jamestown, ND 58401  
(701)252-1970
- 
- Gopher Signs              Commercial supplier full line of signs and barricades.  
1310 Randolph Avenue  
St. Paul, MN 55105-1956  
(612)698-5095
- Ben Meadows Company    Commercial supplier, limited line.  
Atlanta, GA 30366  
1(800)241-6401
- Hall Signs                 Commercial supplier full line of signs and barricades  
3000 North Third, P.O. Box 515  
Bloomington, IN 47401  
1(800)284-7446

Lyle Signs                                      Commercial supplier full line of signs and barricades  
7934 Wallace Road  
Eden Prairie, MN 55344  
Phone: 612-934-7653  
Fax: 612-934-0406

DNR Service Centers                      Information and some traffic signs                      by special order.









**M. MAINTENANCE**



ROAD MAINTENANCE LOG - INSPECTION INSTRUCTIONS

USE OF THE FORM Operators are to fill out daily not weekly. Send in bi-weekly with payrolls. Circle the MAINTENANCE LOG portion of the title.

DATE Month-day-year (i.e. 1-17-91)

ROAD NAME Lost River, Stoney River, Hedbom, West White Pine, etc.

ACTIVITY Grading, installing culverts, ditching, cleaning up blowdown, or whatever work is being inspected.

"Travel" between sites should also be recorded in this column and time recorded in the hours column.

CONDITION This should be recorded when inspecting roads. The item being inspected should be placed in the activity column above the notation of the condition. Maintenance condition will be noted in this column as satisfactory (OK), IMPROVE, or REQUIRED. Each activity, such as grading, culvert cleaning, tree removal, gates, etc., should be noted on a separate line.

START MILE Show the mile point (or junction) the work started.

END MILE Show the mile point (or junctions) where the work ended.

HOURS Record the time spent on this activity

EQUIPMENT USED Record the type of machinery used for this maintenance activity: grader, JD-350, backhoe, drag, etc. For inspection reports indicate the machinery used or needed for the work described.

REMARKS Use this space to enter road conditions that may need further attention, such as: holes in the road, plugged culverts, culverts needed, culverts damaged, or anything else that will keep the road in good condition. Be sure to note which road and location you are referring.

## ROAD MAINTENANCE

Maintenance of state forest roads for the purposes of this manual means:

All activities involving the upkeep of state forest roads: including ditch cleaning, right-of-way clearing, culvert cleaning and replacement, bridge repair, subgrade restoration and surface blading and replacement.

The following are some indicators the road manager should look for when planning his maintenance schedule:

- |              |                         |                       |
|--------------|-------------------------|-----------------------|
| 1. Washboard | 4. Number of complaints | 7. Impeded water flow |
| 2. Ruts      | 5. Garbage              |                       |
| 3. Debris    | 6. Excess vegetation    |                       |

Temporary warning signs should be used whenever maintenance is taking place. Refer to sign section for sign standards and suggested signs.

### Types of Maintenance

**Grading:** Grading is a series of operations to maintain or improve the road condition. One step is blading with the bottom edge of the grader blade to rework the surface material. Proper blading involves cutting to the bottom of the lowest washboard and spreading the gravel uniformly across the road surface. The ideal grading operation results in a smooth, hard finish. No windrows are left to catch water or to act as a dam. During dry periods, water may need to be added to the road surface. Moist gravel packs better and produces a harder driving surface. See the road contracting section for grading specifications.

Sod removal is important and can be accomplished with a grader. It must be scraped off the shoulder with the blade and rolled toward the center of the road. The dislodged sod is then be rolled back and forth with the blade to remove any gravel that might be mixed with it. Then it can then be burned on the road, loaded onto trucks and hauled away, or deposited on the outer edge of the right-of-way. Do not put the sod in ditch bottoms.

Proper surface drainage is necessary for the road to remain dry and firm. Proper crowns of 2% to 4% are maintained, except at road intersections where the road should be flat. This allows rapid water removal. A grader blade can be used to reshape the crown.

Ditches tend to fill with vegetation, silt runoff, or surfacing material, but can be reclaimed with a grader. Blades can be tilted at an extreme angle on some grader models, allowing the front and back slopes cleaned of debris and excess soil. Ditch bottoms can also be cleaned in this way. Large debris is removed before working the ditch with a grader blade. All excavated material is hauled away.

Dust Control: Dust control is important on a gravel surfaced road for two reasons:

1. Large amounts of dust can be unsightly and dangerous.
2. A large amount of dust indicates the small particles that bind gravel together are being lost.

Dust can be controlled by watering the road surface and grading to mix the water with the gravel. Calcium chloride (CaCl<sub>2</sub>) salt is also an effective dust control agent. It draws moisture from the air and keeps the surface of the road wet. It can be applied in three ways:

1. Mixed with class V gravel in powder or pellet form before placing on the road;
2. Applied on the road surface and mixed with a grader blade;
3. Applied to the road surface in a water solution.

The solution form is generally 30%, and can be applied anytime from the lifting of road restrictions to June. Dust control is effective for about a year, but if applied periodically its effect builds up over time. The typical solution rate is .27 gallons per square yard. An estimated cost for a large project is \$.80 to \$1.00 per applied gallon. Calcium chloride can reduce the amount of grading by hardening the surface.

Right of Way: Right of Way (ROW) is a general term for land or an interest in a strip of land, devoted to a road or highway. Management of the roadway surface involves maintenance of gravel and dirt materials. Management of the rest of the right of way consists of vegetation maintenance. Keeping

the surface and subgrade dry is important. If trees and brush are not kept off the right-of-way, they raise the humidity and prevent the road from drying after rain.

Brush and trees often invade and encroach into road ditches. Right of ways are periodically mowed or sprayed to eliminate brush and trees. Herbicides will probably not need to be used as often as mowing, since they kill the vegetation. If practical, choose a herbicide that will not kill grasses. Always refer to

Operational Order 59 (Pesticide Use and Management), and the Division of Forestry's Pesticide Guidelines. All brush management should treat both the in-slope and out-slope. Excess brush in the ditch or side slopes can impair the user's vision. When treating brush on a curve, more attention is paid to the inside rather than the outside curve.

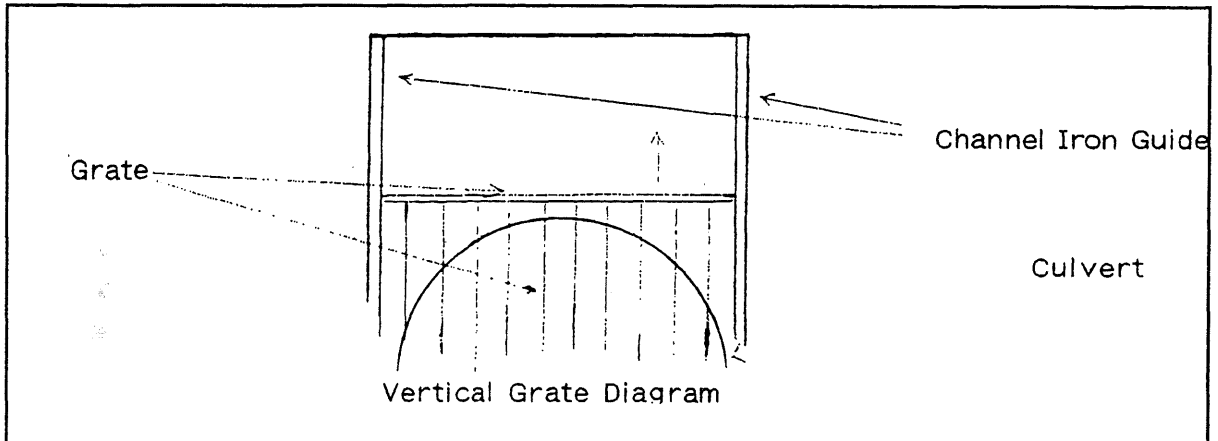
Any right of way management program must consider sod management. Annual mowing of the ditches is done to keep the grass from getting too rank. Periodic mowing makes the road more pleasing to the eye, and improves the health and density of the sod in ditches and slopes. Local wildlife needs may change the timing of mowing or spraying.

The ROW must also be cleared of dead falls and other debris. This is important for the safety of the road user and other management activities. A small Area contract can be let annually to cut all dead falls. They are removed to the top of the backslope and deposited back in the woods. Unnatural debris is hauled away from the road.

Beaver: Beaver can indirectly damage a road by raising the water level on either side, or cause water to wash over it. They can also increase the moisture content in the subgrade, making it soft and subject to traffic damage. The water level is usually raised by a dam downstream or next to the road. By plugging a culvert, beaver can effectively make the road into a dam. They can be destroyed with explosives and removing the beaver. Care is taken not to blow up any culverts or the road. Dams in or near the culvert or road are removed mechanically. Culvert plugging can be reduced by placing a vertical grate on the upstream end of the culvert. The grate is pulled upward regularly allowing debris to flush through the culvert. Personnel should never enter a culvert to clean it.



Vertical Gate Diagram



**Culverts:** Culverts are used to transfer water from one side of a road to the other. They allow water to continue its natural course through the watershed. Any objects that impede water transfer are removed when maintenance work is scheduled. Debris from beaver dams is removed as described above.

Excess silt in the culvert bottom can reduce water flow. Siltation may indicate the culvert is set too low, and it should be dug up and reset at a higher level. Another option is to create a small settling basin below the downstream culvert end.

Culverts are not designed to support the weight of a vehicle by themselves, and arch culverts are particularly weak. Compacted gravel on the top and sides provide most of the strength. A culvert is usually crushed by traffic when there is not enough compacted gravel on the top and sides. Gravel over the culvert should be one foot deep, or half the culvert diameter, whichever is greater. When installing a culvert, make sure the gravel is adequately compacted. Culverts not properly set may develop a bow or swayback in the middle, requiring resetting and compacting the gravel beneath it. (See Minnesota County and Township Permit Responsibilities earlier in the Manual for more information on proper culvert installation.)

**Gates:** More gates will be needed as the state forest road system grows, and pressures to protect resources increase. Once gates are in place they have to be maintained. A major maintenance problem is vandalism. This can be reduced if gates are put in

immediately after a road is built. This will keep the public from getting used to driving the road. If a parking area with a sign explaining the road closure is constructed, it should further reduce vandalism.

Gates should never drag across the road surface when opened or shut. If this happens, the gate should be set higher on the hinge post, or the hinge post reset to a vertical position. A rest post is provided so the gate can hang on it when open, taking weight off the hinges. This allows the hinges to remain in a vertical position. Both the rest and latch posts should have a block or iron plate that the gate rests on, taking strain off the latch. Gates and posts should always have reflectors on them. See the sign section for details.

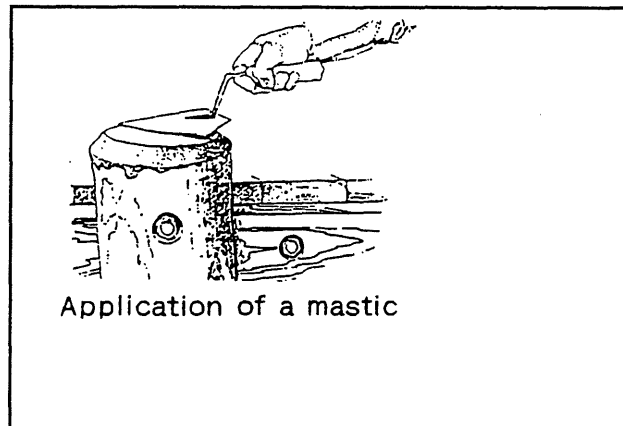
**Signs:** Maintenance of road signs should be regularly scheduled. They must be checked periodically for replacement, repair, or painting. This can be done along with other road maintenance, such as culvert replacement. As with gates, a major feature of sign maintenance is vandalism. When placing a sign, non removable fasteners will prevent theft. High density plywood will withstand more damage from bullets and other objects than other materials.

**Bridges:** Decay is a common problem in timber bridges and directly related to wood moisture. Timber bridge maintenance can be divided into three types:

1. Preventive
2. In-place treatment
3. Major maintenance.

**Preventive:** Control of moisture is the most practical technique for maintaining a bridge. Bituminous or asphaltic pastes or mastic must be used to cover end grain, joints, cracks, or holes to prevent water from entering. This must be done before decay starts. Care must be used so moisture isn't trapped or sealed behind the coating. Since these mastics dry out, they must be periodically reapplied. Oil can also be brushed on exposed surfaces. Metal caps should not be used as they will funnel water into the wood if punctured.

Most water problems can be stopped by making the deck an impervious roof over the rest of the bridge. This will allow the bridge to shed water before it reaches the stringers and other parts. A three-inch asphalt mat on the deck can be effective. All gravel and dirt should be removed from the deck as it holds water.



**In-place:** An increment borer can be used to check for internal rot. Inspection holes are filled to prevent the introduction of water and decay. Replacement cores are available from Wheeler Consolidated Inc. If periodic bridge inspections have detected early decay, an in-place application of a chemical is appropriate. Pentachlorophenol or fluor-chrome-arsenic-phenol is effective if brushed on or sprayed. Fumigants such as Vapam or Chloropicrin can be applied through bored holes to kill fungi.

**Major Maintenance:** This becomes necessary when a load bearing member is severely weakened. Periodic bridge inspections should detect decay long before this happens. Replacement members must be properly treated after they are cut and drilled to the proper dimensions. These must be installed so they do not trap moisture on surfaces or interfaces.

Another problem is movement or shifting of bridge parts. This occurs when a part shifts away from another, such as abutment movement. This can affect the structural integrity and strength of a bridge. If movement is detected during the annual bridge inspection, a certified engineer must be notified and defects corrected. Metal parts should also be checked for rust.

Bridge inspection is required by law every other year. This can be done by MNDOT, County Engineers or the Bureau of Engineering. Copies of the Bridge Inspection Report (Mn/DOT TP-17108-02) are sent to the Region and St. Paul offices.

**Spot graveling and resurfacing:** Holes, soft spots, or ruts in the road indicate problems in the subgrade. The road surface will remain firm only as long as the subgrade is firm. Fixing these problems can be expensive because the surfacing must be stripped off, and the subgrade reshaped and packed. If a spot is a perpetual problem, a layer of filter fabric beneath the subgrade may help.

**Snow Plowing:** The Division of Forestry does very little snow plowing, except in areas of high winter recreational use. Sometimes it is done by a County or Township when a forest road is a commonly used link to other roads. Loggers often plow a forestry road for hauling wood. No matter who plows the road, the forester must make sure gravel is not removed. To avoid this, two inches of snow must be left on the road. Shoes are required on skidder and crawler blades. Major road damage can be done in a short time when gravel is removed, especially if there is no frost. Snow removed from the road must be plowed into ditches and not left next to the road. See Snow Removal Section located after this section for specifications.

### ROAD MAINTENANCE STANDARDS

The Division of Forestry recognizes five levels of road maintenance. They are defined as follows:

**Level 1:** All class I, II, III and some class IV roads fall into this maintenance category. Maintenance is intensive enough to allow passage of virtually any motor vehicle from May to November. Blading is done when needed to keep the surface of the road in a usable condition for a passenger car.

Damage that prevents public travel, such as flooding or wind-thrown trees, is repaired within two days whenever possible. Damage that does not prevent public traffic but affects other parts of the road, such as blow-downs in the ditch, is repaired within a month. Roads are maintained so the user can safely travel at the design speed.

**Level II:** Most class IV roads would fit into this class. Maintenance is intensive enough to allow a passenger car to travel on it at least part of the year. The road is always maintained to allow passage of a high-clearance vehicle. Blading should occur as needed to meet this standard. Repairs are done within two days. Damage that prevents public travel is repaired within two weeks. Damage to the ditches or other non surface part of the road is fixed sometime during that maintenance season. Maintenance is done to allow traffic to travel at the design speed.

**Level III:** Class V roads fit into this category and are considered low maintenance. Blading may occur once or twice per year as needed for Forestry access. Traffic flow may be interrupted or slowed because of poor road conditions. Passenger cars may never use a road in this maintenance level. This road level is normally left open, but can be closed.

Damage to the road surface is fixed when convenient. Damage that prevents traffic flow is repaired as needed. The road surface may not be stable under all conditions and may have rutting. Vehicles can maintain a speed of 15 mph following maintenance.

Level IV: Roads at this level are not maintained and should be closed or gated after use. They may be posted with rectangular signs stating: "Foot Travel Welcome, Closed to all Public Motor Vehicle Use."

Level V: Roads at this level are closed to public travel. They may be gated or closed and posted with rectangular signs stating: "Foot Travel Welcome, Closed to all Public Motor Vehicle Use."

## STATE FOREST ROAD MANUAL

### SNOW REMOVAL

Snow removal is done to preserve and protect roads, and insure safe and efficient transportation. It also shall prevent excessive erosion damage to roads, streams and adjacent lands.

REQUIREMENTS: Snow removal work by permittee shall include:

1. Removal of snow from entire road surface width including turnouts.
2. Removal of snow slides, earth slides, fallen timber and boulders that obstruct normal road surface width.
3. Removal of snow, ice, and debris from culverts so the drainage system will function efficiently.
4. Snow removal is done as necessary to insure safe, efficient transportation. Work is done under the following minimum standards of performance:
  - a. Removal of material. All debris, except snow and ice, removed from the road surface and ditch is deposited away from stream channels at agreed upon locations.
  - b. During snow removal operations, banks are not undercut. No gravel or other selected surfacing material is bladed from the roadway surface.
  - c. Ditches and culverts must be functional during and following roadway use.
  - d. Snow berms are not left on the road surface. Berms left on the shoulder of the road are removed, or drainage holes opened and maintained. Drainage holes shall be spaced as required for satisfactory surface drainage without discharge on erodible fills.
  - e. Dozers shall not be used to plow snow on forest roads without written approval of the Forester.
  - f. Snow is not removed down to the road surface. A minimum of two inches of snow is left to protect the roadway.
  - g. Damage from snow plowing shall be repaired by the permittee.

## ROAD REPAIR USING WOOD CHIPS

by

John Stanton, Warroad Area Silviculturist

Roads with a sand surface, poor base, and heavy traffic can develop dangerous holes or soft pockets. Extended drought can compound this problem. Soft spots usually occur on sharp curves, intersections, and occasionally on straight stretches. They can be as large as 60 feet in length and 30 inches deep. Gravel can be used but will not permanently repair the road in extremely dry weather conditions.

Use of wood chips for road construction in swampy areas was discussed a few years ago at a seminar, and paper mills mix bark and sand to repair wet areas on their storage yard roads. It was decided to use 30%, 40%, and 50% mixtures of chips and sand on a trial basis. A grader removed and windrowed loose sand from the road down to a firm base, mixed and spread the chips, and packed the blend with its blade. The 50-50 blend seemed to work best. The repairs held without future maintenance as the chips seemed to hold available moisture and stabilize the road. Four years later the chips are still holding.

The chips cost \$20 per yard and consisted of aspen and balsam poplar. They were purchased from the producer who supplies the Warroad school heating plant. Although chips are more expensive than gravel, it's a good way to repair soft pockets on dry, sandy roads.

Presented at the Silviculture and Roads Annual Meeting; January 29 - 31, 1991 at the Rainbow Inn, Grand Rapids, MN.

## RECLAMATION OF SAND AND GRAVEL PITS

The Division of Minerals has recently developed "A Handbook for Reclaiming Sand and Gravel Pits in Minnesota. The purpose of the handbook is to provide technical information to landowners and agencies about reclaiming sand and gravel pits. The handbook contains information on mine planning, environmental regulations and reclamation guidelines.

Any new sand or gravel pits on forestry administered lands should require that the operator reclaim the pit once the resource is exhausted or when operations are completed and the pit is not expected to be reopened. Old gravel pits should also be reclaimed as funds are available.

Copies of this handbook have been distributed within the Division. Contact your Regional Office if you do not have a copy.

## GRAVEL STOCKPILE MANAGEMENT

The need for managing gravel stockpiles has become increasingly critical with the increased use of ATV's in state forests. This policy is designed to consider safety and the limited resource needs and visual aspects.

1. Location - Gravel pits and stock piles should be located out of road sight whenever possible. This will improve visual appearance and reduce inviting others to use the site.
2. Pit Wall - The face, or working surface, of the pit should be well cleaned. If the pit will be used regularly, the face does not have to be back sloped but should be fenced or clearly marked for day and night visibility. If reentry is not anticipated within one or two years, the face should be sloping less than 2:1. Quarries are not required to be sloped like this until exhausted, but must be fenced 20 feet back from the edge.
3. Stockpile - The stock pile should be left in a stable condition. Usually the crushing operation forms the initial stock pile using a conveyor system. This is sufficient for short term storage where the material will be used within the same year. If storage is longer than this, or after the main project has been completed, the stock pile should be sloped to a flatter angle of 2:1 or 3:1. This low angle will reduce the hazard for ATV's and erosion potential. Take care to prepare the pit floor for this wider base so the material



can be easily recovered. Spreading the pile in a small pillow is not desirable since it makes gravel recovery very difficult.

4. Pit Plans - Every gravel pit and quarry should have a plan for orderly development. This should include the direction and limits of the source, machinery location, and terms of completion for successive operations. All plans must consider the BMP's in terms of runoff and debris generated. Fuel and oil spills are of great concern in these locations and must be reported to PCA.

5. Access - Vehicular access to the pit should be controlled by a gate where the pit is close to other ownerships and remote from our normal activities. During pit operation, contractors may wish to install gates for protecting their equipment and supplies. Access by ATV's is difficult to control without a perimeter fence. Where there is danger from materials in the pit or traffic beside the pit, a perimeter fence should be considered.

No manner of protection is entirely risk free and some people may even ignore DANGER OR NO TRESPASSING signs. It is our responsibility to provide reasonable notice of potentially unsafe conditions and not to protect all people from their own actions.







Minnesota Department of Natural Resources  
Division of Forestry

# STATE FOREST ROAD MANUAL

## N. INVENTORY

## STATE FOREST ROAD MANUAL

### ROAD INVENTORY MANUAL DRAFT ITEMS TO BE INVENTORIED

#### A. FORESTRY ADMINISTERED ROADS

The following information will be recorded for all roads which fall into category A, State Forestry Administered roads. Table I through X and all included subsections. The information will be recorded on the road inventory form (revised 91). Class 6 roads will not be structurally inventoried unless they are critical to our needs and have substantial information to be recorded.

#### B. ROADS BELONGING TO OTHERS BUT NOT NUMBERED

The following information will be recorded for roads falling into category B, Unnumbered Roads Belonging to Others. All items from tables I and II. The information will be recorded on the road inventory form (revised 91). Class 6 roads which are important should be inventoried in this manner.

#### C. ROADS ADMINISTERED BY OTHER AGENCIES SERVING STATE FOREST LAND

The following information will be recorded for roads falling into category C, Other Agency Roads. Items in tables I and II as it pertains to state land only. The information will be recorded on the road inventory form (revised 91). If no easements are required from the state the information should be supplied on the map and no inventory card will be filled out (most class 6 roads will also be handled in this manner).

The coding of information will be done in the field in accordance with the coding rules which are attached.

Historical data will be added to the data base at a future time. This is necessary to provide background information for legal dealings in regards to specific road situations.

Each entry from I to 101 will be listed in a separate space on the ROAD INVENTORY FORM. Many features for one segment of road may be listed on the same page but a new page should be filled out for each road. Some roads will require multiple sheets.

The descriptive title for each feature is designed as quick reference and not intended to give full details.

ALL CODES MUST BE WRITTEN OUT AS PROVIDED IN ORDER TO FACILITATE COMPUTERIZATION. Each feature is further described by the sub-information which follows it.

Any time a characteristic or feature changes along a road there should be a new entry in the road log.

NOTE - THESE RULES WILL BE DETERMINED AS WE GET CLOSER TO COLLECTION AND COMPUTERIZATION OF THE FIELD INFORMATION. Comments are requested for the entries with the \*\*\* in the left margin. Note what changes or deletions need to be made for these items?

ROAD INVENTORY - STRUCTURAL FEATURES  
ROAD LOG

I. **Header Information**

1. Date Conducted - Date (month (2), day(2), year(2))
2. Recorder - Enter personal recorder number - if unknown or no number has been assigned enter 2 initials and last name.
3. County Number - As determined from the statewide alphabetical listing of counties.
4. Road Number - As determined according to the road numbering system (1988).
5. Road Name - The name by which this road is signed or referred to. The name may refer to an entire road system.

II. **A. Forest Access Description**

6. Administrator - Enter the correct code from the list below. For

## STATE FOREST ROAD MANUAL

state forestry administered roads enter Region and Area - Where roads are administered by more than one area/agency give mile post limits of responsibility and report road as two connecting roads on two forms with their mileage being additive. If the road is administered by others use 999 for RAD. e.g. SF 330 or TR 999.

SF - Forestry

SW - Wildlife

CF - County Lands

CT - County

TR - Town - township or city road

FR - USFS

IT - Industry, include company name in comments.

CO - Cooperative under an agreement with others.

7. Legal Start - The legal description of the starting point of the road. Forty or lot, section, township and range. Range must end in 9 for ranges east and 0 for ranges west.

8. Seasons Available (for use) -

1 = Winter

2 = Summer & winter

3 = Summer, fall & winter, normal "all weather" roads

4 = Spring, summer, fall & winter.

9. Snow Plowing -

Yes - Snow plowed annually by a government agency

Occasional - Sometimes snow plowed by a government agency

No - Not snow plowed by a government agency



10. Map ID - Management - maps for TMPIS and other management activities. All seasonal roads should show up on these maps. This is the highest level of detail and is not available to the general public. All fire, recreation and public roads will be shown at this level of detail.

Fire - maps will be printed only for use in fire suppression activities. Roads accessible during fire season but not available to the general public can be shown on these maps. Recreation and public roads will also appear on these maps.

Recreation - only roads which are available for public use should be shown on these maps. These maps may be distributed to the public on request.

All - the roads in this category will be forwarded to MN/DOT for inclusion on the county road and other general distribution maps as they are revised.

## B. Maintenance Description

11. Maintenance Responsibility - Include the year maintenance began on a somewhat regular basis.

SF - Forestry

SW - Wildlife

CF - County Lands

CT - County

TR - Town - township or city road

FR - USFS

IT - Industry, include company name in comments.

CO - Cooperative under an agreement with others.

12. Varies -

Yes -The level of maintenance varies with projected or actual traffic volumes.

No - Maintenance level is constant.

- \*\*\*
13. Road Maintenance Level - note only at beginning unless it changes. These codes will change to reflect a new multi-level maintenance classification based on the vehicles the road is designed to accommodate.
- 1 - weekly
  - 2 - every two weeks
  - 3 - every three weeks
  - 4 - monthly
  - 5 - every 6 weeks
  - 6 - every two months
  - 7 - twice per year
  - 8 - closed, no maintenance
14. Begins MP - the point at which the maintenance level begins. This is usually 0.00.
15. Change To - the new level of maintenance, if it changes before the end of the road. Use the same code list as in number 13.
16. Mile Post (MP) - The mileage reading from the start of the road where this change occurs.

**C. Ownership data**

17. Inventory Category -

A - Forestry administered and maintained roads or those with easements to DNR.

B - Industrial roads or roads across other agency lands where the agency is not taking management responsibility for the road.

\*\*\*

C - Roads which are numbered by other agencies which the DNR is the primary user or maintainer.

18. Other Agency # - Fill this number in where the same road is numbered by another agency ( e.g. coop roads, Township roads).
19. End MP (mile post) - this should indicate the total length of the road unless responsibility for the road changes where the road crosses an Area boundary in which case it should refer only to the mileage within the Area. The total mileage between areas should add up to the total road length shown on the map.

### III. Road Description

#### A. Road Class

20. Start MP - Mileage at start of this road class. Begin at 0.00.
21. Road Class - Class of forest road.
  - 1 - Paved forest road
  - 2 - Two lane 45 MPH alignment
  - 3 - Lane and a half 30 MPH alignment
  - 4 - Single lane with turnouts 25 MPH
  - 5 - Single lane 20 MPH with drainage
  - 6 - Single lane minimal construction often seasonal
22. Start MP - Mile post of any changes.
23. Class - Road Class I to 6 as defined in the road plan.
24. Start Co. # - County number where road starts
25. Cross Co. # - Number of county that road crosses into.

## STATE FOREST ROAD MANUAL

26. MP - Mileage to county line from the start of the road. (This may be taken from maps using other features along the road to determine the correct mileage).

B. 1. a. **Surfacing**

27. Start MP - Mileage at start of surfacing type. Begin road at 0.00.

28. Surfacing Depth - The average depth as measured at several locations along the road and across the width. Use a shovel to determine this measurement. If this changes use a second sheet.

29. Width - Width of road surfacing.

30. Material - If the surfacing material changes use a second sheet.

as - pavement hot rolled asphalt

bt - cold rolled asphalt

oi - oiled surface or other surface stabilization

gr - gravel/crushed rock

pr - pit run

na - native ground/sand, dirt, etc.

sd - sand

sa - sod or other vegetative surface

31. Class - Classification system and size of material used.

ca \_\_\_\_ - MNDOT class size 1983 spec book  
(ca5 = Class 5)

in \_\_\_\_ - maximum size (use for pit run material)

us \_\_\_\_ - USFS class size 1979 spec book

as \_\_\_\_ - asphalt grade 1983 MNDot spec book

#### IV. Right-Of-Way Description

32. Mile Post - Mileage at start of Right-of-Way description. Begin at 0.00.

33. Width - The average width of right-of-way to the limit of the obvious clearing width which has been established over time.
34. Maintenance Method
- 1 - mowed
  - 2 - mechanical brushed
  - 3 - hand brushed
  - 4 - brushed and chemically treated
  - 5 - chemically controlled
35. Frequency Years. - Years between treatments.
36. Vegetation - Type of vegetation most prominently on the right-of-way.
- sd - sod
  - fb - herbs and forbs
  - bg - wet site species
  - sb - shrubs and vines
  - tb - woody - trees and large shrubs

**A. Easements**

37. Exist - Are there any easements for this road?
38. Name - The property owner whose property the easement crosses.
39. MP - Mileage at start of easement (this may be taken from maps using other features along the road to determine the correct mileage).

**V. Intersection**

40. Road Number - Number as specified by owner of road intersecting or joining.
41. Mile Post - Distance from start of forest road to where the intersection occurs.

42. Owner - Owner of intersecting road.

tr - township  
ct - county  
cf - county land road  
ch - county state aid highway  
mn - state highway  
sf - state forest road  
sp - state parks road  
sw - state wildlife road  
fh - federal highway  
fw - freeway  
fr - federal forest road  
bi - Bureau of Indian Affairs  
tr - Indian tribal road  
in - industrial forest road  
pr - private road  
re - resort or other commercial road  
ir - mining road  
go - other government road  
ut - utility road or right of way  
db - ditch bank county drain ditch

43. Azimuth - Azimuth of road which intersects as taken from the centerline of the forest road.

44. Length - Approximate length of intersecting road.

1 - less than ¼ mile  
2 - ¼ to ½ mile  
3 - ½ to 1 mile  
4 - 1 to 5 miles  
5 - Over 5 miles

\*\*\*  
\*\*\*

45. Width - Average width of intersecting road.

46. Surface Type -

as - pavement hot rolled asphalt  
bt - cold rolled asphalt  
oi - oiled surface or other surface stabilization  
gr - gravel/crushed rock  
pr - pit run  
na - native ground/sand, dirt, etc.  
sd - sand  
sa - sod or other vegetative surface

47. Structure - Use this to record culverts, bridges or road closure devices on the intersecting road. Also record data on structures at the same mile post.

cu - culvert  
br - bridge  
gt - closure

48. Season - Seasons available for use -

1 = Winter  
2 = Summer & winter  
3 = Summer, fall & winter, normal "all weather" roads  
4 = Spring, summer, fall & winter.

## VI. Signs

49. Mile Post - Distance from start of forest road to where this sign occurs.

50. Material- Sign material.

sp - painted steel  
al - aluminum  
pw - plywood  
tt - treated timber

wt - wood painted or untreated  
fg - fiberglass

51. Type - Wording on sign face.

st - stop  
yd - yield  
cr - curve right  
cl - curve left  
mc - multiple curve  
nb - narrow bridge  
dl - delineator - fog marker  
rf - reflector signs - striped for bridges etc.  
dt - destination  
cn - caution  
ld - load limit  
cd - road closed  
if - information - smokey or fire etc.  
cg - campground  
pa - public access  
st - state forest  
rn - road name  
ru - road number  
wa - wildlife area

52. Dimensions - Width and height in inches (2 digits each) i.e. 3030 (30 X 30),  
4824  
(48 X 24).

53. Side - L - left or R - right.

54. Reflective - Sign face .

- Add an R if the sign is high reflective (engineering grade) material.



- Add a D if the sign is super reflective (diamond grade) material.

pt - painted

rt - routed and painted

eb - embossed

sb - sticky back

la - laminated

\*\*\*

55. Condition - The face and support both should be considered on the date of inspection.

G - Good - The sign and post are properly installed and easily visible.

F - Fair - The sign face or post is in less than desirable condition or the location is not quite right but the sign is still readable.

P - Poor - Either the sign face or post is in need of replacement or the location is poor and the sign should be replaced.

56. Post - Support material for the sign and its dimensions (i.e. tt4-6). Circular posts have only one dimension.

tt - treated timber post

hp - highways U post

sq - square steel post

wt - painted or untreated wood post

lo - log post

mo - other metal post

fg - fiberglass post

57. Aspect - The direction the sign faces (e.g. N, NNW, SE).

## VII. Turnouts -

58. Mile Post - Distance from start of forest road to the center of the turnout.

59. Side - L - left or R - right

## STATE FOREST ROAD MANUAL

60. Length - from end to end of tapers in feet.

61. Width - in feet from shoulder of main road

62. Surface Type -

s1 - same material and depth as road

s2 - same material as road but 1/2 depth

s3 - native material or common fill

### A. NOTES

63. Notes - Any general notes about the road which are not covered by the inventory data.

VIII. **Gates, Berms or Rocks** - Keys for all gates are assumed to be in the possession of the forestry office. If this is not the case please note this in the notes section.

64. Mile Post - Distance from start of forest road to the gate or berm. Fill this number into the left hand column under the gate/berm heading.

65. Material - Material used for gate construction or obstruction.

sr - steel no paint

sp - steel painted

gl - galvanized

bw - barb wire

sw - smooth wire or cable

tt - treated timber

wt - sawn timber

lo - log

gl - gravel

rr - rip rap large rock in pile

po - posts

66. Posts - Materials used to support the gate. Leave blank if it is a berm or barrier.

wp - wood post  
tp - treated post  
st - steel post  
wc - well casing or heavy pipe

67. Height - Measured from the road surface to the top of the structure at the average road centerline elevation to the nearest 0.5 foot.

68. Width - opening to nearest 0.5 foot.

69. Configuration -

sin - single  
dbl - double with no center post  
ctp - double with center post

70. Reason - Why is the road closed?

ma - management access only - no public use  
mc - reduce maintenance costs  
wo - washout/requires bridge or culvert work  
po - poor conditions - continued maintenance need  
wl - wildlife habitat management  
es - endangered species  
tc - trails conflict  
er - easement restriction  
ab - abandoned road  
se - seasonal use road

71. Period of Closure

brkup - breakup annually  
mm-mm - month to month

72. Condition

- g - good - like new materials and treatment ok
- m - moderate - some rust, deterioration or minor damage.
- p - poor - major damage but repairable
- r - replace - not economical to repair

IX. **Culverts** - also see note on bridges for multiple installations.

73. Mile Post - Distance from start of forest road to the culvert.

74. Material -

- sr - steel no paint
- sp - steel painted
- sa - steel with asphalt or tar coating
- gl - galvanized
- al - aluminum
- tt - treated timber
- wt - sawn timber
- lo - log
- co - concrete
- cp - prestressed concrete
- pc - pvc or abs plastic
- fg - fiberglass
- pp - paper

75. Shape -

- ci - circular
- ar - arch
- ov - oval
- bx - box culvert - rectangular
- pa - plate arch no bottom in structure

76. Length - Round up to the nearest whole foot, new culverts are normally sold in two foot increments. Length should include aprons if they are installed.
77. Diameter - Measure diameter or horizontal measure (for arch and oval pipes) in inches. Standard diameters for circular culverts are: 6, 8, 10, 12, 15, 18, 21, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96 continue by 6" steps.
- Width for standard arch culverts in inches are: 17, 21, 24, 28, 35, 42, 49, 57, 64, 71, 77, 83.
- Occasionally a larger round pipe has been elongated 5% and should be installed with its long axis in the vertical position. If the pipe does not meet normal dimensions check this possibility before writing an odd size down.
78. Condition -
- n - new - shiny surfaces inside and out
  - g - good - dull finish inside and out
  - m - moderate - rusty out side and dull inside
  - small hole or dent
  - p - poor - rusty inside and out or major damage
  - r - replace - rusted through or non functional
79. Apron and Installation - e.g. stream, catch basin & type of fill.
- 0 - no apron
  - 1 - 1 apron on upstream end
  - 2 - 2 aprons
  - 3 - 1 apron on downstream end
80. Height - Dimensions are in inches. For circular pipe write 00 for height. Heights in inches for standard arch culverts are: 13, 15, 18, 20, 24, 29, 33, 38, 43, 47, 52, 57.

## X. Drainage & Structural Components of the Road

### A. Water control devices

81. Exist - Does one or more of these items exist along the road.
- a. Impoundments for wildlife or flood control.
  - b. Water diversion structures. How many of each exist along the road.
82. Lead Off Ditch - Enter the number which exist.
83. Water Bars - Enter the number which exist.
84. Broad Based Dips - These are long based water bars that allow a vehicle to cross them without the abrupt jarring. Enter the number which exist.

### B. 1. **Subgrade support** - If more than one section exists use multiple sheets or the space above.

85. Mile Post - Distance from start of forest road to the start of subgrade support.
86. Length of Support in Feet.
- 
87. Width of Support Materials to the Nearest Foot.

### 88. Material

- cd - corduroy (logs, railroad ties, pipe, etc.)
- fb - fabric (geotextile, petromat...)
- tm - tire mat
- mm - metal mat
- wc - wood chips
- ot - other - write in

### C. **Grade changes** - Enter this information where grades exceed 5% note any visible change in the grades. Particularly at the top and bottom of hills.

89. Maximum Grade - Enter the maximum grade in %.
90. Number Changes - How many changes of grade greater than 5% occur along the road?
91. Maximum Change - Enter the maximum change in grade within a 200 to 300 feet road segment. e.g. A change from +5 to -9 is a 14% change.

**Bridges** - MNDot inventory card must be filled out. NOTE: multiple culverts with a total span on the centerline of the road of 10 feet or more are considered bridges. Fill out culvert and bridge data at same mile post.

92. Mile Post - Distance from the start of the forest road to the bridge.
93. MN/DOT # - These are usually preceded by a letter and will provide the link to the MN/DOT data base for more bridge information.
94. Feature Crossed - Enter the name of the stream or ditch as well as the type of feature.
95. Warnings -

nb - narrow bridge signs  
nr - narrow bridge and reflective signs  
rf - reflective signs (type 3 hazard markers)  
ns - no signs or some missing

XI. **Trails** - Use this portion to record trails which are on the same right-of-way as the road whether it is parallel or just crossing the road. Each time it crosses the road a new entry should be made.

96. Mile Post - Distance from start of forest road to the trail crossing or beginning.
97. Type of Trail -

hi - hiking  
by - bicycle  
av - ATV  
sn - snowmobile  
sk - ski touring  
hs - horse

98. Location - Along the road right-of-way.

middle - on middle of road  
left - to left of centerline and distance in feet  
right - to right of centerline and distance in feet  
xing - crossing

99. Alternate location - This is entered as "left" or "right" and distance in feet if none write none.

100. Page - Enter the number of this page for this road. Each sheet is considered one page either one sided or two sided.

101. Pages - This is the total number of pages for this road.

Entries 100 & 101 should read page 3 of 5, page 4 of 5, etc.



STATE OF MINNESOTA  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF FORESTRY

July 12, 1988

CIRCULAR LETTER TO: ALL PERSONNEL

SUBJECT: STATE FOREST ROAD NUMBERING SYSTEM

**PURPOSE:**

The Minnesota State Forest Road System consists of a network of roads with diverse purposes and physical characteristics. A numbering system is needed to identify the individual road segments that presently make up the road network as well as the segments which may be developed in the future.

The individual numbers of all the segments will provide a method for cost accounting of road expenditures as well as a means of locating specific problems or routes.

Sequential numbers in a logical order should be easily understood by frequent and occasional users of the road system. A numbering system has been designed to accomplish these purposes and allow for future expansion of the road network without upsetting the sequence of numbers.

**GENERAL RESPONSIBILITIES:**

The Forest Road Program Coordinator will assign road numbers for the main roads (arterials) for an Area when requested by the Regional Forest Supervisor. All roads will be numbered as part of the first phase of a transportation or unit plan or reinventory process. In order to have numbers assigned in a logical manner, the Area Forester will be responsible for mapping all roads, accesses and truck trails in the Area before making a request for numbering.

**POLICIES:**

Counties are a stable entity on which to base the numbering system. The numbering system is designed primarily to handle three types of forest road within each road network; arterials, collectors, and local roads. This may be expanded to a fourth category, spurs, as the need arises.

# STATE FOREST ROAD MANUAL

All road numbers will start with a two (2) digit numerical code for the county in which the majority of mileage of a road, and its tributaries are located. The numerical code for the county will be in accordance with the list in Appendix A. A road that crosses a county line will retain the same county and road number, so that the road may be uniquely identified for computerization. Numbering will begin in the SW corner of the county and proceed in a clockwise manner around the county leaving blocks of unassigned numbers to accommodate future or anticipated additions to the road network. In some cases the road may run through a series of counties as well as Area and Region boundaries. The general rule will be to number the road system in sequence for the county in which the largest portion of the road mileage lies. See Figure No. 1.

## ROAD NUMBER REMAINS THE SAME IN TWO ADJACENT COUNTIES.

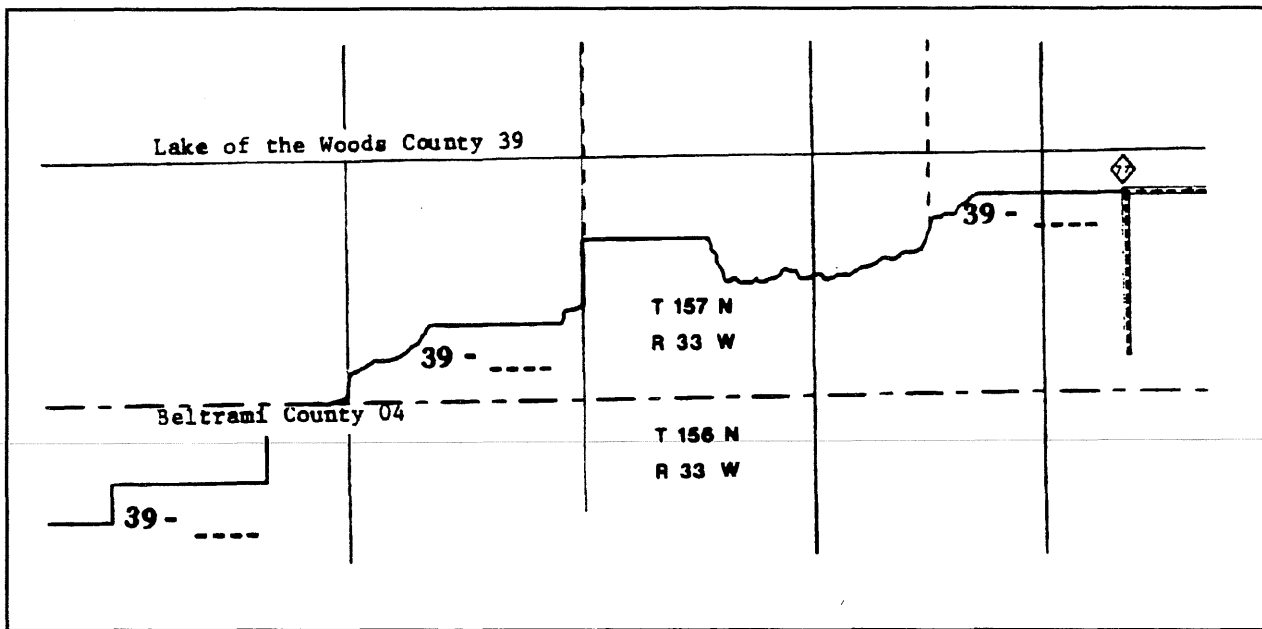


FIGURE NO. 1

## ARTERIALS

The first road leaving a numbered public road (Township road, County Road or highway, state or federal highway) or a numbered USFS road is considered an arterial. The arterial will carry a four-digit number. See Figure No. 2.

THE 1200th ARTERIAL WITHIN COUNTY 39 (L.O.W.)

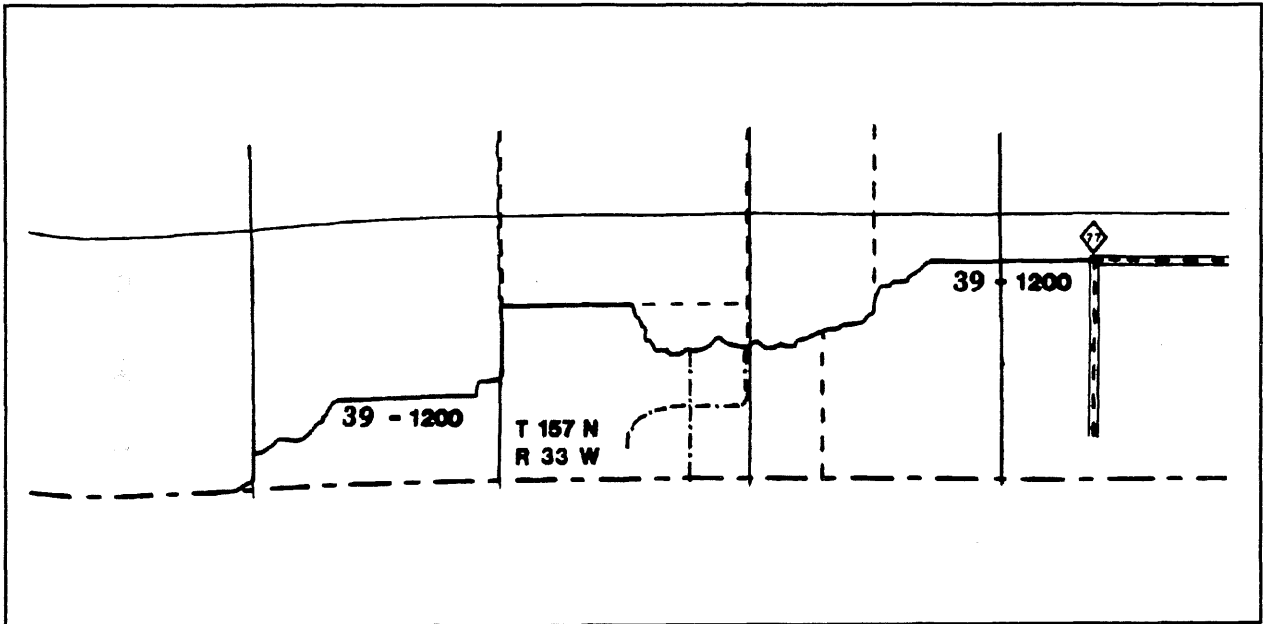


FIGURE NO. 2

COLLECTORS

The roads branching from the arterials are collectors. The collectors will carry the same county and arterial numbers as the arterial they logically branch from. In addition, each collector will carry a two (2) digit designation of its own. These will be numbered consecutively in their order of intersection with the arterial, with spaces left to accommodate future additions as necessary. See Figure No. 3.

## STATE FOREST ROAD MANUAL

THE THIRD POSSIBLE COLLECTOR ON THE 200TH SFR IN THE CO.

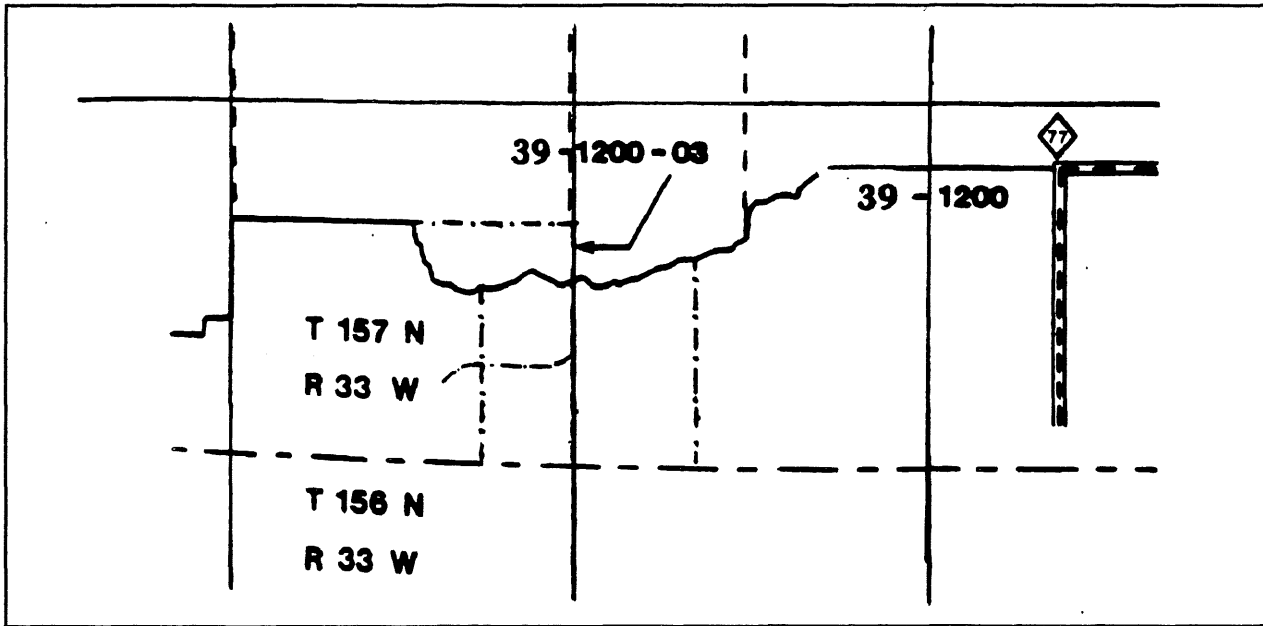


FIGURE NO. 3

### LOCALS

The roads that branch from the collectors are local forest roads (locals). The local will carry the same county, arterial and collector numbers as the collector they logically branch from. In addition, each local will carry a two (2) digit designation of its own. The locals will be numbered consecutively in the order of the intersection with the collector, with spaces left to accommodate future additions as necessary. See Figure No. 4.

THE FOURTH POSSIBLE LOCAL ON COLLECTOR 200-03 IN COUNTY 39

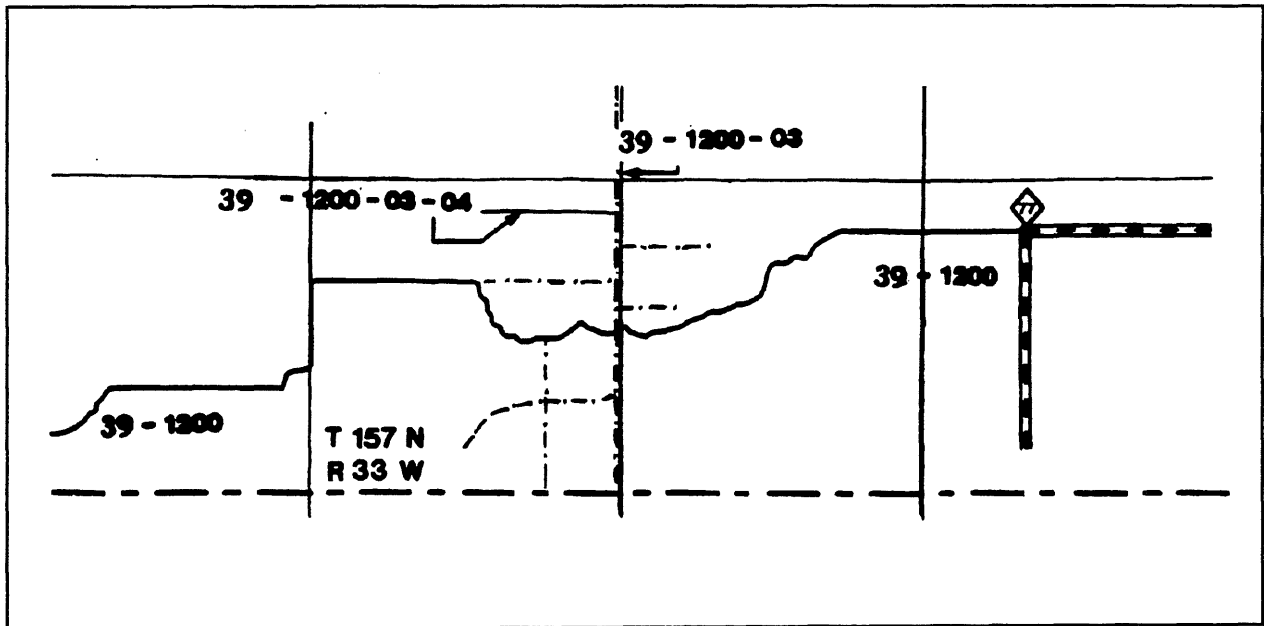


FIGURE NO. 4

SPURS

On occasion, it may be desirable to identify a further branch in the transportation network called spurs. Spurs will be identified by adding another digit to the road number, again leaving the appropriate number of spaces for to accommodate future development.

PROCEDURES:

The numbering of the arterials will be done by the Forest Road Program Coordinator in consultation with the Regional and Area Foresters involved to avoid duplication of numbers. Sufficient spacing will be left in the initial designation to allow for the addition of more arterial roads as they are constructed or added to the system.

## STATE FOREST ROAD MANUAL

The Area Forester will be responsible to number all collectors, locals, and spurs for the roads in the Area. Where roads cross Area boundaries, the Area Forester involved will be responsible to coordinate with each other to number collector, local, and spur roads to provide a logical sequence to the numbering and avoid duplication.

Once an Area's roads are numbered, it will be the Area Forester's responsibility to request new numbers for arterials and number the other new roads in the Area.

### Appendix A. County Numbers

Gerald A. Rose  
Director,  
Division of Forestry

APPENDIX A.  
COUNTY NUMBERS

<u>Code</u>		<u>Code</u>		<u>Code</u>	
01	Aitkin	39	Lake of the Woods	77	Todd
02	Anoka	40	Le Sueur	78	Traverse
03	Becker	41	Lincoln	79	Wabasha
04	Beltrami	42	Lyon	80	Wadena
05	Benton	43	McLeod	81	Waseca
06	Big Stone	44	Mahnomen	82	Washington
07	Blue Earth	45	Marshall	83	Watsonwan
08	Brown	46	Martin	84	Wilkin
09	Carlton	47	Meeker	85	Winona
10	Carver	48	Mille Lacs	86	Wright
11	Cass	49	Morrison	87	Yellow Medicine
12	Chippewa	50	Mower		
13	Chisago	51	Murray		
14	Clay	52	Nicollet		
15	Clearwater	53	Nobles		
16	Cook	54	Norman		
17	Cottonwood	55	Olmstead		
18	Crow Wing	56	Ottertail		
19	Dakota	57	Pennington		
20	Dodge	58	Pine		
21	Douglas	59	Pipestone		
22	Faribault	60	Polk		
23	Fillmore	61	Pope		
24	Freeborn	62	Ramsey		
25	Goodhue	63	Red Lake		
26	Grant	64	Redwood		
27	Hennepin	65	Renville		
28	Houston	66	Rice		
29	Hubbard	67	Rock		
30	Isanti	68	Roseau		
31	Itasca	69	St. Louis		
32	Jackson	70	Scott		
33	Kanabec	71	Sherburne		
34	Kandiyohi	72	Sibley		
35	Kittson	73	Stearns		
36	Koochiching	74	Steele		
37	Lac Qui Parle	75	Stevens		
38	Lake	76	Swift		

FOREST ACCESS INVENTORY FORM - 1										DRAFT 6		March 18, 1991		PAGE /PAGES					
DATE		RECORDER		CO.NO.		ROAD NUMBER						ROAD NAME							
FOREST ACCESS DESCRIPTION		ADMIN. BY		LEGAL START		LOT-40		S		TWP		USE SEASONS 1 2 3 4		SNOWPLOW YES NO OCCASIONAL		MAP ID: ALL RECREATION MAN- AGEMENT FIRE			
MAINT'C. DES- CRIPT'N		RESPONSIBILITY		VARIES YES NO		LEVEL		BEGINS MP		CHANGE TO		MP		CHANGE TO		MP			
INV. CATEGORY: A B C		OTHER AGENCY #		END MP															
ROAD CLASS		START MP		CLASS		START MP		CLASS		START CO.#		CROSS CO.#		MP					
SURFACING		START MP		DEPTH		WIDTH		MATERIAL		CLASS									
RIGHT/ WAY DESCRIP'TN		MP		WIDTH		MAINTC. METHOD		FREQ. YRS		VEGETATION									
EASEMENTS		EXIST YES NO		NAME		MP		NAME		MP		NAME		MP					
INTERSECTN RD NUMBER		MILE POST		OWNER		AZIMUTH		LENGTH		WIDTH		SURFACE		STRUCTURE		SEASON			
SIGNS		MILE POST		MATERIAL		TYPE		DIMENSION		SIDE		REFLECTIVE		CONDITION		POST		ASPECT	
TURNOUT		MILE POST		SIDE		LENGTH		WIDTH		SURFACE		NOTES:							
GATE/BERM		MATERIAL		POSTS		HT		WIDTH		CONFIG.		REASON		PERIOD CLOSED		COND.			









DIVISION OF FORESTRY GLOSSARY OF TERMS FOREST ROADS MANUAL

A

**ABNEY LEVEL** A type of clinometer.

**ABUTMENT** The structure that supports the end of a bridge and retains the bank.

**ACCESS CONNECTION** Any roadway facility by means of which vehicles can enter or leave an arterial highway. Included are intersections at grade, private driveways, and ramps or separate lanes connecting with cross streets or frontage roads.

**ACTUAL QUANTITY (AQ)** This method of payment is used when the items are bid with unit prices and the final payment is based on the actual quantity of material supplied. The final quantity must be determined prior to payment. This method works well for culverts and trenches or behind culvert and turnouts. Quantity estimates should be as close as possible to provide an accurate description of the work.

**ADVERSE GRADE** Ascending grade in the direction of travel.

**AGGREGATE** Crushed rock or gravel screened to sizes for use in concrete and road surfaces.

**ANGLE OF CROSSING** The acute angle between the intersecting centerlines of the road and the stream, highway, or railway crossed.

**ASPECT** The direction a slope faces with respect to the cardinal compass points.

**AUTHORIZATION** The written approval, by authority, of the Chief Engineer or other duly authorized representative of the Commissioner, or regulation forms, for changes in or extras to plans or changes in the quantity of work.

**AVERAGE HAUL** The average distance that roadway grading material is to be hauled from cut to fill, measured between centers of mass.

**AVERAGE DAILY TRAFFIC (ADT)** The average 24 hour volume, being the total volume during a stated period divided by the number of days in that period. Unless otherwise stated, the period is a year.

**AWARD** The decision of the State to accept the proposal of the lowest responsible bidder for the work, subject to the execution and approval of a satisfactory contract therefore and bond to secure the performance thereof and to such other conditions as may be specified or otherwise required by the law.

**B**

**BACKCUT** The final cut in felling a tree, made on the side opposite the direction of fall, after the undercut.

**BACKFILL** Earth or other material used to replace material removed during construction, such as in pipe bridge abutments.

**BACKSITE (BS)** A reading taken with a level when the rod is on a point of known elevation, OR a reading taken with a transit or compass of a previously occupied position.

**BACKSLOPE** That portion of the earth grade or roadway in cuts which is beyond the side ditches and rejoins the natural ground.

**BALANCE** (a) To equalize the quantities of embankment and excavation. (b) To adjust a survey traverse.

**BALLAST** (a) A term for the surface structure of a road when the same material, such as pit run rock with soil binder, is used throughout. (b) Material such as coarse rock used to stabilize weak ground.

**BANK EXCAVATION** When excavation is calculated the earth to be moved is said to be in a bank when it is in its original location. The natural state of the material is assumed to have some amount of consolidation and an adjustment factor must be applied to the bank quantity to get the amount of yardage to be hauled.

**BANK MEASURE** Volume of soil or rock in its natural state in the ground.

**BASE OR BASE COURSE** A layer of selected, processed, or treated aggregate material placed immediately below the pavement or wearing surface and above the sub-base or basement soil.

**BASELINE** A surveyed line running through or near the site of proposed construction, from which subsequent points are located.

**BEARING STRENGTH** The load-carrying ability of a soil or subgrade.

**BENCH MARK** A relatively permanent point of known or assumed elevation along the course of a survey line.

**BERM** Curb or dike constructed to control roadway runoff water.

**BID** The offer of a written contract price for doing work and/or supplying materials.

**BIDDER** The individual, partnership or corporation formally submitting a proposal for the work planned or any portion thereof, acting directly or through an authorized representative.

**BINDER SOIL** Material which consists primarily of fine soil particles such as clay or stone dust.

**BINDER** (a) Generally sand or fine material which solidifies aggregate in a road surface. (b) A chain or wire rope tightened around logs on a truck to prevent the load from spilling. Also "wrapper."

**BLADE** (a) The part of a bulldozer or grader which digs and pushes dirt but does not lift it. (b) To scrape or level a mound of dirt or area of ground with a blade.

**BLUE TOP** A stake driven to subgrade whose top indicates finish grade.

**BORROW PIT** An excavation made for the purpose of obtaining material for an embankment, located outside of the right-of-way.

**BORROW** All material used in constructing a grade, making embankments or sub-bases, which does not come from necessary excavation, within the roadway.

**BOX CULVERT** A concrete or wood culvert - rectangular in shape, having all four sides of wood/concrete -i.e., concrete bottom slab, two concrete walls, and a concrete top slab.

**BREAKWATER** A fixed or floating structure that protects a shore area, harbor, anchorage, or basin by intercepting waves.

**BRIDGE TRAVELED WAY WIDTH** The clear width measured at right angles to the longitudinal centerline of the bridge between the bottom of curbs or, if curbs are not used, between the inner faces of parapet or railing.

**BRIDGE LENGTH** The overall length measured along the centerline of road or trail, back to the back of backwalls of the abutments, if present; otherwise, end to end of the bridge floor, but in no case less than the total clear opening of the structure.

**BRIDGE** A structure, with a span of 10 feet or more measured from abutment to abutment, which carries a highway over a road or waterway.

**BROW LOG** A log placed parallel to the roadway at a landing or dump.

**BUFFER STRIP** See "leave strip".

**BURDEN** (a) The distance from a drilled blasting hole to the rock face. (b) The volume of rock to be moved by the explosive in a given drill hole.

## C

**CALENDAR DAY** Every day shown on the calendar, Sundays and holidays included.

**CAPACITY (HIGHWAY)** The ability of a roadway to accommodate traffic.

**CAPILLARITY** The action by which water is drawn to the surface of soil or other material.

**CAT ROAD** A path created by tractors skidding logs or, loosely, any crude roadway cut by a bulldozer.

**CATCH POINT** The lowest point down from the road surface on a clearing as designated on the ground or on the drawings.

**CATCH BASIN** A receptacle for diverting surface water to a culvert, sewer or sub-drain.

**CENTERLINE** The center of a road as calculated from baseline points and from which all structures and stakes are located, and grades referenced.

**CHANGE ORDER** A written order to the Contractor, signed by the Engineer, ordering a change in the work from that originally shown by the Plans and Specifications that has been found necessary. If the work is of a nature involving an adjustment or unit price, a Supplemental Agreement shall be executed. Change orders duly signed and executed by the Contractor constitute authorized modifications of the Contract. This factor is based on the type of material to be used, and its uniformity as well as its original and final resting places.

**CHANNELIZATION** The separation or regulation of conflicting traffic movements into definite paths of travel by the use of pavement markings, raised islands, or other suitable means to facilitate the safe and orderly movements of both vehicles and pedestrians.

**CHANNELIZED INTERSECTION** An at-grade intersection in which traffic is directed into definite paths by islands.

**CHORD OFFSET** A method of staking a curve.

**CLEAR SPAN** The distance between the two inside faces of the supports of a (bridge) span.

**CLEARANCE** The unobstructed width and height of the roadway or waterway of a structure.

**CLEARING LIMITS** The limits of fill where compacted material meets the natural ground.

**CLEARING** Cutting and disposing of all trees, stumps, brush, shrubs, and other vegetation occurring within the right of way, which interfere with excavation, embankment or vision.



**COEFFICIENT OF TRACTION** The ratio of tractive force, before slippage, to the total weight on the drivers. Also "tractive efficiency."

**COFFER DAM** Temporary walls or enclosures for protecting an excavation. Generally, to permit work to be carried out on a nearly dry site.

**COMPACTED MEASURE** Volume of soil or rock after it has been placed and compacted in a fill.

**COMPACTION FACTOR** When material is placed in a fill, or native material is used in place, for support of a road then the material will compact, either by design or simply as a result of the natural properties of the material. A factor is applied to determine the amount of material that will be required to bring the final road to the proper grade.

**CONDEMNATION** The process by which Property is acquired from unwilling sellers through legal terms of the Contract, and acting directly or through a duly authorized representative.

**CONSTRUCTION SLASH** All vegetative material not meeting utilization standards, such as timber, brush, and grubbed stumps associated with construction or reconstruction of a facility.

**CONTOUR OFFSET** The horizontal distance from P-line to road template centerline, as scaled from the cross-section plot.

**CONTRACT BOND** The statutory bonds executed by the contractor and the surety, guaranteeing performance of the contract and the payment of all lawful indebtedness pertaining thereto.

**CONTRACT TIME** The number of Working Days or Calendar Days specified for completing the work, or the period from the date specified for starting construction operation to the date specified for completing the work, as the case may be.

**CONTRACT** A written agreement, valid in form between the State and the Successful Bidder, by which the Contractor is bound to perform the work contemplated, in accordance with the Plans, Specifications, Special Provisions, and Supplemental Agreements, and by which the State is Bound to compensate him therefore at the mutually established and accepted rate or price. The Contract includes the Proposal, Contract Bond Plans, Standard Plates, Special Provisions, and Specifications

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pertaining to the work or materials therefore. Any Supplemental Agreements entered into subsequent to the execution of the Contract will also become a part of said Contract.

**CONTRACT PERIOD** The period from the date specified for starting construction operations to the date on which the specified number of Working Days or Calendar Days, as the case may be, has elapsed, both dates inclusive, or from the date specified for starting construction operations to the date specified for completing the work.

**CONTRACTING OFFICER** The person executing this contract on behalf of the Government and includes a duly appointed successor.

**CONTRACTOR** The party of the Second Part of a Contract; the individual partnership, or corporation undertaking the execution of the work under the proceedings for road or building purposes.

**CONTRACTORS PRE-QUALIFICATION** The classification and rating based on the experience and financial statement filed by the bidder.

**CONTROL POINTS** Points identified along a proposed road projection which help define a permissible route. Such points are the take-off and end of the road, saddles, passes, stream crossings, benches, obstacles, etc.

**CORDUROY** Logs, poles, stumps, brush and other material embedded under the subgrade within the limits of the roadbed.

**CORRUGATED METAL PIPE (CMP)** Also used generically to mean culvert of any material.

**CRAWLER** Any machine mounted on and propelled by tracks.

**CREST** Highest point in the centerline grade or ditch profile at a grade change.

**CRIB** A framework of interlocking timbers built in log cabin style, generally filled with soil or rock, to act as a bridge pier, abutment, or retaining wall.

**CROSS CONNECTION** A connecting roadway between two nearby or generally parallel roadways.

**CROSS SECTION** A survey line or plan drawing that is taken at 90 degrees to the normal direction of travel on the road.

**CROWN** The highest point on the curved surface of a road; and a measure of the vertical distance between the highest point and the edge or lowest point of the surface.

**CROWN SLOPE** The ratio of vertical to horizontal distance between the road center and the shoulders.

**CUBIC YARD** A unit of volume measuring 27 cubic feet.

**CUBIC YARD MILE** A combination of linear and volumetric measurement meaning the movement (haul) of a cubic yard of material 1 mile.

**CULVERTS** All waterway structures not defined as bridges.

**CURVE WIDENING** Widening the road on the inside of a sharp curve to allow the rear wheels of a long truck to remain on the road.

**CURVE RADIUS** The radius of the center-line or the outside edgemoor, of a turning lane.

**CUSHION MATERIAL** Native or imported material generally placed over rocky sections of unsurfaced roads to provide a usable and maintainable traveled way.

## **D**

**DAYLIGHT** The point at which the ditch or cut meets the natural ground without changing slope.

**DEADMAN** A completely buried anchor, often a log.

**DEFLECTION ANGLE** In surveying, the angle between a new line and the extension of the preceding line.

**DEGREE OF CURVATURE** The central angle, in degrees, subtended by a 100 - foot (30.48 - meter) arc or 100 - foot chord.

**DENSITY (TRAFFIC)** The number of vehicles per unit length of the traveled way at a given instant.

**DESIGN VOLUME** A traffic volume used in design, representing traffic expected to use the highway. Unless otherwise stated it is an hourly volume.

**DESIGN QUANTITY (DQ)** The amount of a given material or work that is required to complete the project as designed by the engineer. When used as a bid quantity this is the amount of material that will be paid for unless the project either exceeds or underruns by 25% or it is the contractors responsibility to prove an overrun and the inspectors responsibility to detect a shortfall for adjustment purposes.

**DESIGN LOAD** The maximum load that a road or structure is designed to carry on a regular basis throughout its intended life.

**DESIGN SPEED** A speed determined for design and correlation of the physical features of a highway that influence vehicle operation. It is the maximum safe speed that can be maintained over a specified section of Highway when conditions are so favorable that the design features of the highway govern.

**DETOUR** A temporary route for traffic during construction operations.

**DRAIN TILE** Pipe of burned clay, concrete, etc., in short lengths-laid with open joints.

**DRAINAGE AREA** The surface of land enclosed by the dividing line, from which all water flows to the stream at the point under consideration.

**DRAWBAR** A fixed or hinged tow bar extending out the rear of a tractor.

**DRAWINGS** The documents, including plan and profile sheets, cross sections, diagrams, layouts, schematics, and descriptive literature.

E

**EARTH GRADE** The completely graded roadway before trenching or placing of surfacing material.

**EARTHWORK** The quantities of soil that must be moved for embankment and from excavation as computed from road cross-sections.

**EASEMENT** A grant of an indefinite right of use of land or highway purposes.

**EDM** Electronic Distance Measurer

**EMBANKMENT** The raised portion of a Roadbed which is below the subbase, base and surface courses which is built up in layers consisting principally of soil or broken rock or combinations thereof.

**END OF PROJECT (EOP)** End of project.

**END HAUL** In roadwork, removing excess excavated soil longitudinally along a road instead of sidecasting.

**ENGINEER** The Chief Engineer of the Department of Natural Resources of the State of Minnesota, in the case of a Contract entered into by the said State; the Division Director in the case of a Contract entered into by the said Division or the duly authorized Engineer of any other governmental subdivision or authority, in the case of a Contract entered into by such governmental subdivision or authority; each acting directly or through a duly authorized representative.

**EPHEMERAL STREAM** A stream that carries water only during and immediately after a rain.

**EQUALIZER** A culvert - placed where there is no cross channel but where it is desirable to have water at equal elevations on both sides of the road.

**ESTIMATE** (a) A statement showing probable cost and/or probable quantities of a proposed project. (b) Final Estimate - an estimate made from final checked quantities showing work performed and materials furnished, upon which final payment is made. (c) Progress Estimate - an

estimate made periodically as the work progresses showing work performed and materials furnished.

**EXCAVATION** The removal off soil. Also "cut."

**EXTRA WORK** Additional construction items which were not originally included in the contract.

**F**

**FACTOR OF SAFETY** The ratio of the breaking strength of a line or member to the applied load.

**FAVORABLE GRADE** Descending grade in the direction of traffic.

**FILL** See "embankment."

**FILTER FABRIC (GEOTEXTILE)** A fabric or textile like material designed to be used in the ground for subgrade support or material separation.

**FINES** Binder material that passes a # 200 sieve. Helps compaction & holds larger materials together.

**FLARED INTERSECTION** An un-channelized intersection without islands other than medians, where the traveled way of any intersecting leg is wider or an auxiliary lane is added.

**FLOW LINE** The bottom of a stream bed, the floor of a box culvert or the invert of a pipe.

**FORESIGHT (FS)** A arrangement of the visible elements of a road, such as alignment, grades, sight distances, widths, slopes, etc.

**FREE HAUL** The distance that the excavated material must be moved without any additional contract payment. When material must be moved more than this distance then an adjustment is made to the contract price for the OVERHAUL. Overhaul is usually paid for by the station-yard, yard-mile or ton-mile.

**FRENCH DRAIN** A drain created by burying large rocks, usually wrapped in filter fabric, for the purpose of draining water from a non-point source. This functions much the same as large drain tile.

**FRONT END LOADER** A wheel or tractor loader with a bucket or fork hinged to lifting arms which loads or digs entirely at the front end.

**FROST HEAVE** Deposits of highly capillary silty soils and very fine sand due to the effect of freezing.

**FUNCTIONAL LIFE** The period of time during which a structure performs as intended. Performance can be expressed in terms of benefits obtained versus the cost of installation and maintenance.

## **G**

**GABION** Metal or plastic cages filled with rock to prevent excess erosion. They may be used to line channels or rock the bottom of low water crossings where there is danger of the water washing out or under cutting rip rap.

**GEOMETRIC DESIGN** The reading taken on a point of unknown elevation or position for the purpose of establishing its position.

**GRADE STAKE** A stake set to show the distance that the ground surface is above or below a desired grade level.

**GRADE BREAK** A change in the slope of a road gradient.

**GRADE CROSSING** The intersection of a highway and railroad at the same elevation.

**GRADE CONTOUR** A line drawn on a topographic map representing a road gradient.

**GRADE** The profile of the center of a roadway or the ratio of rise or fall to its length, of the several parts of the profile. To establish a profile by cuts and fills.

**GRADE SEPARATION** A crossing of a highway and a railroad at different levels.

**GRADE RESISTANCE (ASSISTANCE)** The force of gravity resisting (assisting) movement on an adverse (favorable) grade.

**GRADE LINE** A marked gradient line in the field for the road survey line to follow.

**GRADIENT** The slope or grade along a specific portion or roadway.

**GRANULAR MATERIAL** Any natural or synthetic mineral aggregate such as sand, gravel, crushed rock, or slag, not more than 20% of which (by weight) passes the No. 200 sieve.

**GRAVEL** The natural product resulting from the reduction of rock by the action of the elements, not more than 20% of which passed the No. 200 sieve and which may contain stones up to 1 cubic inch in volume.

**GRIZZLY** A coarse screen or grate used to (a) separate oversize pieces from soil or loose rock, or (b) act as a gate on a chute. Load immediately as produced.

**GROUND CONTROL** Accurately fixed points on the ground, both horizontally and vertically and identifiable on air photos.

**GROUND WATER** Water which is standing in or passing through the ground.

**GRUBBING** Removing and disposing of stumps, roots, logs and brush.

**GUARD POST** A post erected for identification of culverts or other structures OR warning of low or dangerous places.

**GUARD RAIL** A fence built along highway shoulder lines as a protection against driving off a highway.

**H**



**H20** The engineering term to denote a single truck with no trailer weighing 8,000 lbs on the front axle, and 32,000 lbs on the rear axle(s) for a total of 40,000 lbs.

**HAUL** The distance grading material is moved in the construction of a roadway.

**HEADWALL** A wall of concrete or masonry placed at the end of a culvert or pipe line to retain the earth fill.

**HEIGHT OF INSTRUMENT (HI)** The elevation, either assumed or real, of the line of sight of the level.

**HIGHWAY** The entire area within the Right of Way. ALSO - That portion of the template from the shoulder to the bottom of the ditch.

**HIGHWAY TRUCK** A truck designed to haul a load not exceeding legal highway limits.

**HORIZONTAL ALIGNMENT** The plan view of a route or that part of road design concerned with the horizontal curvature of a road.

**HORIZONTAL CLEARANCE** An area cleared of vegetation, trees, rock ledges, limbs and logs along either side of the trail tread.

**HOT LOG** To log and "hot load".

**HOT LOAD** To load out directly without intermediate storage, stockpiling or cold decking.

**HS20** The engineering terminology to denote a tractor trailer combination of full legal weight for bridge design calculations. The vehicle is assumed to have the following weights - 8,000 lbs front axle, 32,000 lbs on each set of truck and trailer axles, for a total weight of 72,000 lbs.

**HUB** Wooden stake or peg used in surveying for reference points for lines and for grades.

**I**

**INDEPENDENT DITCH** A ditch having grades that differ from the centerline grades of the highway.

**INDURATED** Hardened.

**INFILTRATION** The entrance of ground water into a pipe through joints or perforations.

**INSLOPE** The condition where the outside shoulder is the highest point on the cross section of the road. The inslope is normally about 4% and is designed to move the water from the road surface into a ditch to prevent excessive erosion of the fill slope. Many corners end up this way through use and not through design of super-elevation in the initial construction.

**INSPECTOR** The authorized representative of the engineer, assigned to make a detailed inspection of all or any portion of the work or materials therefore.

**INTERCEPTING DITCH** A ditch at the top of a slope to prevent surface water from flowing over the slopes.

**INTERMITTENT STREAM** A stream that carries water only part of the year.

**INTERSECTION** The general area where two or more highways join or cross, including the roadway and roadside facilities for traffic movements in that area.

**INTERSTATE** Between two or more states.

**INTRASTATE** Wholly within one state.

**INVERT** The floor or bottom of a conduit, culvert etc.

**ISLAND** A defined area between traffic lanes for control of vehicle movements or for pedestrian refuge. Within an intersection a median or outer separation is considered an island.

**ITEM** A unit of work for which a price is provided in the Contract.

**J**

**JETTING** Forcing water into holes in an embankment to settle or compact the earth.

**K**

**KEY** A projection or depression designed to prevent movement of adjoining parts of a structure or pavement.

**KIP** A unit of weight or force equal to 1,000 pounds (kilo or rock pound).

**L**

**L - LINE** See "Location Line."

**LANE** A strip of roadway intended to accommodate the forward movement of a single line of vehicles.

**LEACHING BASIN** A basin without a concrete bottom out of which water percolates into the surrounding soil.

**LEAVE STRIP** A strip of uncut timber left between cutting units or adjacent to another resource, such as a stream. Also "buffer strip."

**LEDGE** A bed of rock.

**LEVEL** A surveyor's telescope used to measure the difference in elevation between two points.

**LEVELING ROD** A graduated rod in two or three sections, and often with a sliding metallic disc used as a sighting target for a level. Also "target rod" and "stadia rod."

**LIQUID LIMIT** The minimum moisture content which will cause soil to flow when jarred slightly.

**LOAD LIMIT** The maximum weight or load that a structure or road can carry repeatedly without causing damage. (Rutting of roads or pumping of mud through the gravel is considered damage.)

**LOAM** A soil having a relatively even mixture of the different grades of sand, silt, and clay.

**LOCATION LINE** The staked centerline of the road consisting of tangents and curves usually designed from the preliminary line survey. Also "L-line."

**LOOSE MEASURE** Volume of soil after it has been loosened by digging or blasting.

**LOSS** A term used in earthwork computations to estimate or approximate the volume of useable earth displaced by roots of trees, brush, etc., and by leaves and litter on the surface of the ground.

**LOST CORNER** Corner marking obliterated. Corner can be reestablished only by a resurvey.

**LUMP SUM PRICE** The price paid for lump sum quantities of work. This may also be use for total contract price where there are no items to be paid for on a unit price basis. The contract bid form may include line items for unit prices but these are then to be used for estimation, comparison or negotiation of later bids or change order prices.

**LUMP SUM QUANTITY** Is used when the scope of the work involves a number of different items and there is no need to know the bid price of the individual components for later adjustments or comparisons. This may also be used on occasions where there is not an accurate estimation of the scope of the work.

## **M**

**M. GALS.** One thousand gallons.

**MINIMUM TURNING RADIUS** The radius of the path of the outer front wheel or a vehicle making its sharpest turn.

**MACHINE RATE** The cost per unit of time of owning and operating a piece of equipment.

**MANIPULATION** The use of discs, sheepsfoot rollers, power graders, rollers, etc. in construction of the roadway to insure proper compaction of the earth.

**MASS DIAGRAM** A graph showing the accumulation of cut and fill with distance from a starting point or origin. Cut is usually considered positive and fill negative. The volume is plotted in cubic yards. The distance is usually measured along the centerline in stations starting at the beginning. Swell factors are applied to cut and shrinkage factors are applied to embankments to obtain bank cubic yards excavated and fill compacted respectively.

**MATERIALS** Any substance specified for use in the construction of the project and its appurtenances.

**MAXIMUM DENSITY** The maximum density of a particular soil as determined by the method prescribed in the current edition of the Department of Highways "Manual for Grading and Base Construction."

**MEASUREMENT, STOCKPILE** The measurement computed with dimensions of the in-place material. Computations may be made by the average end area method or prismatic formula for stockpiled material.

**MEASUREMENT, EXCAVATION** The measurement computed by the average end area method from measurements made longitudinally along a centerline or reference line. It should not be used as method of avoiding the preparation of an accurate estimate of the project.

**MEASUREMENT, VEHICLE** The measurement computed using measurements of material in the hauling vehicles at the point of delivery. Vehicles shall be loaded to at least their water level capacity. Leveling of the loads may be required when vehicles arrive at the delivery point.

**MERGING** The converging of separate streams of traffic into a single stream.

**MUCK** Well decomposed organic soil material dark in color and accumulated under the conditions of imperfect drainage.

**MULCH** A loose covering of straw, manure, sand, etc., to reduce evaporation, and to prevent erosion.

O

**OFF HIGHWAY TRUCK** A truck designed to handle loads exceeding legal highway size and weight restrictions.

**OFFSET STAKE** See "reference" stake.

**OFFSET LINE** A line established parallel to the main survey line.

**OPERATING SPEED** The highest overall speed at which a driver can travel safely under prevailing conditions.

**OPTIMUM MOISTURE** The optimum moisture content of a particular soil as determined by the method prescribed in the current edition of the Department of Highways "Manual for Grading, Base and Surface Construction."

**OPTIMUM ROAD SPACING** The distance between parallel timber access roads which minimizes total logging costs.

**OPTION** A written agreement granting the privilege to acquire property or interest therein at a fixed price within a specified period.

**ORDINARY HIGH WATER MARK** On Lakes - the highest elevation which the lake has maintained to leave evidence upon the landscape. On Watercourses - elevation of the top of the bank of the channel. On Reservoirs and Flowages - the operating elevation of the normal summer pool.

**OUTSLOPE** This is the condition where the outside or fill side of the road is lower than the rest of the road. This is desirable when working on moderate to steep slopes and trying to do a minimum of earthwork to provide adequate drainage. Since all the water from the terrain above the road drains across the road surface it is important to be certain that the fill slope is stable.

**OVERBURDEN** Unusable soil or rock covering a pay formation.

**OVERHAUL** The transportation of excavated material beyond certain specified limits.

**P**

**P-LINE** See "preliminary line."

**PAPER PLAN** An initial timber harvest plan using available maps, aerial photos, and timber inventory data. It serves as the basis for field verification and adjustment to the final logging plan.

**PARKING LANE** An auxiliary lane used primarily for the parking of vehicles.

**PAVEMENT STRUCTURE** All material placed on a road subgrade to support traffic loads, usually consisting of courses. Also "surfacing."

**PAY FORMATION** A deposit of soil or rock whose value justifies excavation.

**PERENNIAL STREAM** A stream that carries water the year round.

**PERFORMANCE BOND** The security furnished by the contractor to guarantee the satisfactory completion of a contract.

**PIER** An intermediate support between bridge abutments.

**PILES/PILING** These are slender underground columns, generally placed in groups. They may support their loads through bearing at the tip, friction along the sides, adhesion to the soil, or a combination of these means. Thus the behavior of a pile foundation depends on the strength of the piles and the bearing and shear capacities of the soil.

**PIONEER ROAD** A primitive tractor-trail type of access for moving equipment, workers, and material.

**PIONEER** To initially work over rough or uncleared areas or to make a pioneer road.

**PIT RUN** A natural mixture of sand, gravel, and rock. Also "bank run."

**PLAN AND PROFILE** The final "P-line."

**PLAN VIEW** A drawing of the road (usually center line only) as if seen from directly above. These often involve match lines on a shifting orientation to north in order to keep them on the paper.

**PLANS** Approved drawings or reproductions of drawings pertaining to the construction or details of the work covered by the contract.

**PLASTIC LIMIT, SOIL** The moisture content at which a soil changes from a semi-solid to a plastic or soft and rubbery state.

**POINT OF CURVATURE (PC)** The point where alignment changes from a straight line to a circular curve.

**POINT OF INTERSECTION (PI)** The point where two tangents or straight lines intersect.

**POINT OF BEGINNING (POB)** The start of a survey or project.

**POINT OF CURVE TANGENT (POCT)** A point on a tangent between PC guaranty of good faith to enter into a contract for work proposed.

**POINT OF COMPOUND CURVATURE (PCC)** The point of tangency common to two curves having different radii.

**POINT OF TANGENCY (PT)** The point where the alignment changes from a circular curve to a tangent of straight line.

**POINT OF VERTICAL INTERSECTION (PVI OR VPI)** The point along a road profile connecting two tangents.

**PRELIMINARY LINE** A traverse generally following the flagged grade line of a proposed road route from which a location line is designed. Also drawings for road construction showing L-line plan view and profile with stationing, bearings, distances, curve data, slope stake information, P-line plan view, etc. included.

**PRIME MOVER** A tractor or other vehicle used to pull or power other machines.

**PROFILE** A drawing or survey run along the center line of the road to show the elevation of the road. On paper the line rises and falls as the center line of the road goes up and down.



**PROGRESS CLAUSE** The part of the contract pertaining to the order of proceeding with the various items of the work to be done and the rate of progress for completing said items of work.

**PROJECT** The specific section of the highway together with all appurtenances and construction to be performed thereon under the Contract.

**PROPOSAL** The written offer of the bidder, on the form furnished, for the work proposed.

**PROPOSAL GUARANTY** The security designated in the proposal and furnished by the bidder as a or PT & PI.

## **R**

**RANGE POLE** A light pole marked with alternate red and white bands used as a target when sighting along a line while yarding distance. Also "skyline road."

**RECONNAISSANCE** A preliminary examination of a region with reference to road location.

**REFERENCE STAKE** Stakes set outside road construction limits indicating the station and distance to the centerline or top of cut bank. Also "offset stake."

**REFERENCE POINT (RP)** A marked tree or stake set outside road clearing limits indicating distances and bearings to slope stake, L-line curve, and tangent points, section or property corners, etc.

**RELOCATION** A new alignment varying from the present location.

**RESURFACING** The renewal of the surface course.

**RETAINING WALL** A wall built of stone, concrete, timber, or metal to sustain a mass of earth or fill material behind it.

**REVETMENT** A facing placed on a bank or bluff of stone to protect a slope, embankment, or shore structure against erosion by wave action or currents.

**RIGHT - OF - WAY** The entire area reserved for the construction and maintenance of the roadway and the improvement of the roadside.

**RIGHT OF ACCESS** The right of ingress to a highway from abutting land and egress from a highway to abutting land.

**RIP RAP** Rough or broken stone of various sizes placed together to prevent scour by water flow, or to act as a foundation or retaining wall.

**ROAD** (a) An access and haul route for vehicles. (b) The path followed by a turn of logs skidded or yarded by a cable system. Also "yarding road." (c) In skyline logging, the area bounded by the lateral yarding distance on both sides of the skyline and the external turning angles with a compass.

**ROAD METAL** Broken stone, gravel, slag, gravel, or concrete used in pavement construction; hence the completed road surface.

**ROAD MIX** Mixing gravel or bituminous mixes directly on the roadbed.

**ROAD CLASS** A designation of road types based on surfacing, width, maximum grades, sight distance on curves, and vehicle speed.

**ROADBED** The grade portion of a highway usually considered as the area between the intersections of the top and sideslopes, upon which the base course, surface course, shoulders, and median are constructed.

**ROADSIDE DEVELOPMENT** Those items necessary to the completed highway which provide for the preservation of landscape materials and features; the rehabilitation and protection against erosion of all areas disturbed by construction, by seeding, sodding, mulching or placing other ground covers; such suitable planting and other improvements as may increase the effectiveness and enhance the appearance of the highway.

**ROADSIDE** A general term denoting the area adjoining the outer edge of the roadway. Extensive areas between the roadways of a divided highway and may also be considered roadside.

**ROADWAY** (In construction specifications) The portion of a highway within limits of construction. (General - Except in construction specifications.) The portion of a highway, including shoulders, for vehicular use. A divided highway has two or more roadways.

**S**

**SADDLE** A dip in a ridge or between two peaks, forming a connecting neck of land.

**SANITARY SEWER** A sewer carrying only domestic sewage.

**SCARIFY** To loosen the top soil in preparation for regenerating by direct seeding or natural seedfall.

**SHEAR STRENGTH** The capacity of a body or soil to resist shearing stresses.

**SHEEPSFOOT** A cylindrical tamping roller with metal projections used for compacting soil.

**SHEET FLOW** See "surface run-off."

**SHOULDER** The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

**SHRINKAGE** The amount or percent which excavated material diminished in mass during excavation filling and compaction.

**SIDE SHOT** A measurement of the topographic slope perpendicular to the survey route.

**SIDE SLOPE** The average slope of the ground, in percent, along a yarding road or on either side of a centerline.

**SIDE CAST** To doze or blade waste soil over the downhill side of a road during construction.

**SIEVE** A woven wire sieve (or screen) which meets the requirements of AASHTO Specification M92 for the size specified.

**SIGHT DISTANCE** A length of unobstructed view along a road surface.

**SKEW** The acute angle formed by the intersection of a line normal to the centerline of a road with a line paralleled to the face of the abutments or with the centerline of a culvert; or with the centerline of an intersecting road or railway.

**SKIDROAD** A pathway over which logs are skidded.

**SLASH** Woody debris remaining after logging or road construction.

**SLOPE EASEMENT** An easement for cuts or fills.

**SLOPE STAKE** Stake set at the point where the finished side slope of an excavation or embankment meets the surface of the existing ground.

**SLUMP** (a) A slide or earth flow of a soil mass. (b) The measure of the stiffness or consistency of fresh concrete.

**SPECIAL PROJECT SPECIFICATIONS** The specifications that detail the conditions and requirements peculiar to the individual project, including additions and revisions to Standard Specifications.

**SPECIAL PROVISIONS** Special requirements, regulations or directions prepared to cover work on a particular project not satisfactorily provided by the Standard or Supplemental Specifications.

**SPECIFICATIONS** The Standard Specifications, Supplemental Specifications, Special Provisions, and all written or printed agreements and instructions pertaining to method and manner of performing the work or to the quantities and qualities of the materials to be furnished under the contract.

**SPOIL** Material in excess of requirement for an embankment.

**STABILIZED** The process of giving natural soils or graded aggregates greater strength and durability through the use of admixtures, water and compaction.

**STADIA ROD** See "leveling rod."

**STADIA** A method of measuring distance using a level or transit where the rod is read using the upper and lower cross hairs and finding the difference between the resulting numbers. This difference is then multiplied by the instrument constant (usually 10) to get the distance. The method is fast in the case of a Contract entered into by said County; or any other governmental subdivision or authority acting through its duly, authorized officials or representatives, in the case of a Contract entered into by said governmental subdivision or authority.

**STAGE CONSTRUCTION** The building of a highway part at a time, such as all earth work one year and surfacing the next year.

**STAKE** (a) A stick driven into the ground to mark survey points or define a road's design, or the process of setting such markers. (b) Supports set in slots on the side of a transport vehicle to contain a load of logs.

**STAKED QUANTITIES (SQ)** These quantities are determined from staked measurements prior to construction.

**STANDARD PLATES** An approved set of drawings showing standard details of construction and materials. All references to the Standard Plates (or to any individual Plate) shall be understood to refer to those plates or revisions thereof, as indicated by a sub-letter, which are shown in the Plans.

**STANDARD SPECIFICATIONS** All requirements and provisions contained in the document of Standard Specifications for Road and Bridge Construction.

**STATE** The party of the First Part of a Contract; the State of Minnesota, acting through its duly appointed Commissioner of Natural Resources or his duly authorized representative, in the case of a Contract entered into by said State; the County, acting through its duly elected Board of County Commissioners, and the accuracy is sufficient for forest surveys.

**STATION** A distance of 100 feet measured along the centerline and designated by a stake bearing its number.

**STATION YARD** A combination of linear and volumetric measurement meaning the movement of a cubic yard of material one station.

**STATIONING** A system of defining distance in specified increments from a known point of origin.

**STONE SAND** Highly processed crushed rock of less than 1/4 inch diameter (not screenings).

**STORM SEWER** A sewer for conveying storm and surface water only.

**STRIPPING** The removal of all material between the original surface and the top of any material that is acceptable for permanent embankment.

**STUB ABUTMENT** Short abutment placed in an earth fill (always on piling) to support the end span of a bridge.

**SUB (SURFACE) DRAINAGE** The control and removal of excess moisture contained in the soil.

**SUBBASE OR SUBBASE COURSE** A layer of porous granular material placed on the road bed for the purpose of adding stability to the road, and promoting drainage.

**SUBCONTRACTOR** The individual, partnership or corporation undertaking the execution of a part of the work under the terms of the contract, by virtue of an agreement with the contractor. (Standard Specifications) materials, and incidentals required to complete the construction of the Project in an acceptable manner, and setting forth the basis of compensation, if any.

**SUBCUTTING** A procedure that requires material to be removed from below the desired grade level and then replaced and compacted to provide a firm base for the road.

**SUBGRADE** The portion of the roadbed prepared as a surface course.

**SUBSTRUCTURE** All that part of a structure below the bridge seats or below the skewbacks of arches, including all integral backwalls, wingwalls, and wing protection railings. Backwalls to be constructed integrally with the superstructure shall be considered a part of the superstructure.

**SUMP** A well into which water may be conducted to drain the work.

**SUPER ELEVATION** Tilting of the road surface around curves.

**SUPERINTENDENT** The executive representative of the contractor who is authorized to receive and fulfill instructions from the Engineer directing the construction.

**SUPERSTRUCTURE** All that part of a structure above the bridge seat or skewbacks of arches, not classified as substructure.

**SUPPLEMENTAL SPECIFICATIONS** Detailed specifications, supplemental to or superseding the Standard Specifications.

**SUPPLEMENTAL AGREEMENT** A written agreement between the State and the Contractor, operating as a supplement to the Contract, covering correction of omissions, errors, and discrepancies between the Plans and the Proposal or estimates, or any alterations of the Plans, or additional requirements, work,

**SURETY** The corporate body foundation for the base or which is bound with and for the contractor for the performance of the contract and for the payment of all lawful indebtedness pertaining thereto.

**SURFACE RUNOFF** The generally uninterrupted flow of water over the ground surface without infiltrating. Also "overland flow" and "sheet flow."

**SURFACE COURSE** The top course of a pavement, designed to provide structural values and a surface resistant to traffic abrasion.

**SURFACE DRAINAGE** The control or removal of surface water.

**SURFACING** See "pavement structure."

**SUSTAINED TRAIL GRADE** Any grade found on any given mile for more than 20% or 1,040 feet of that mile.

**SWAMP** To clear brush and obstructions preparatory to surveying or constructing yarding or skidding roads.

**SWELL FACTOR** When material is removed from one resting place to another it takes more space to haul it than it occupies in either its original location or its final location. A swell factor is applied to all yardage to provide an estimate of the amount of effort needed to move the necessary material from its original location, this factor is based on the type of material and its locations (bank or stockpile).

**T**

**TANGENT OFFSET** A method of surveying in a curve either horizontal or vertical without having to occupy the actual center of the circle being laid out.

**TANGENT** (a) The straight-line portion of a road. (b) In surveying, a line between two points.

**TARGET ROD** See "leveling rod."

**TEMPLATE** A plastic pattern of the typical shape of the road to be constructed.

**TEMPORARY STRUCTURE** A temporary bridge, culvert, or grade separation required to maintain traffic during the construction or reconstruction of a bridge, grade separation, or culvert.

**THEODOLITE** See "transit."

**TILE EDGE DRAIN** A tile pipe line constructed off the edge of a pavement to drain the subsoil.

**TILL** A deposit of earth, sand, and gravel and boulders transported by glaciers. Till is un-stratified.

**TITLE** The evidence of a person's right to property or the right itself.

**TOE OF SLOPE** The bottom line of a fill slope or embankment where it intersects the natural ground.

**TON** Short ton consisting of 2,000 pounds.



**TON MILE** A combination of linear and weight measurement meaning the movement of ton of material 1 mile.

**TOP SOIL** A general term applied to the surface portion of the soil including average plow depth (surface soil) or the A horizon where this is deeper than the plow depth. It cannot be precisely defined as to depth or productivity except in reference to a particular soil type.

**TRAFFIC INTERCHANGE** A system of interconnecting roadways in conjunction with a grade separation or grade separations providing for the interchange of traffic between two or more intersecting roadways.

**TRAFFIC ISLAND** Any restricted area permanently located in a roadway which provides for the physical separation and sorting of traffic streams.

**TRAFFIC LANE** The portion of the traveled way for the movement of a single line of vehicles.

**TRAIL TREADWAY** That portion of the right-of-way upon which the intended activity takes place.

**TRAIL RIGHT-OF-WAY** The trail itself, plus a margin of land on either side of the trail, which is usually managed for its resource values and is essential to the recreational experience of the user.

**TRAILHEAD** An access to a trail system which may include a parking area, toilets and other support facilities.

**TRANSIT** A surveying instrument consisting of a telescopic sight mounted on a swivel to measure horizontal and vertical angles and distances. Also "theodolite."

**TRAVELED WAY** The portion of entering the through traffic the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes.

**TRAVERSE** In surveying, a series of distances and angles or bearings connecting successive sighting points along a course.

**TREE WELLS** An open well of stone walls around a tree to retain an embankment (used to permit light, air, and water to get to the tree roots when the road grade is higher than the natural ground.)

**TURBIDITY** A measure of the suspended particles, such as silt, clay, plankton, microscopic organisms, and organic matter, in water that are held in suspension either turbulent flow or by Brownian movement.

**TURN ANGLES** To measure the horizontal angle between two lines or directions with a surveying instrument.

**TURNER ELBOW** A down spout that is fabricated in the field from a piece of the same size culvert and bolted to the main culvert to prevent washing of the fill slope.

**TURNING ROAD TERMINAL** The general area where a turning roadway connects with a through traffic roadway. "exit", used as a modifier, refers to leaving the through traffic lanes and "entrance" refers to lanes.

**TURNING RADIUS** The minimum arc that a vehicle can turn in at low speeds. A figure of 50 feet should be used for logging trucks with 35 foot trailers, 75 feet provides a small margin of safety and allows for longer trailers. At higher speeds the turning radius increases.

**TURNING POINT (TP)** An intermediate point between two stations of interest which is set for the purpose of gathering information or simply advancing the survey.

**TURNOUT** A portion of road widened to allow 2 vehicles to meet.

## U

**UNBALANCED BID** A bid or proposal in which certain unit prices are above a fair price and other unit prices are below a fair price.

**UNDER DRAIN** A tile pipe laid to drain off the surplus water in the subsoil.

**UNIT PRICE** The amount of money per single quantity of a specific term of the several items in a contract.

## V

**VALUE ENGINEERING** A procedure where the contractor may suggest an alternative method or material to be used to obtain the same or better end product at a savings to the owner and the contractor. The normal process requires the contractor to submit the proposal to the engineer in the appropriate form (plan, specifications and estimates) for review. Upon the approval of the owner's engineer they may proceed with the work as suggested. The contractor is normally rewarded for his efforts in these situations by receiving a portion of the savings.

**VEHICLE QUANTITIES** These quantities are measure in hauling vehicles.

**VERTICAL ALIGNMENT** The profile view of a route showing up and down grades and vertical curves, or that part of road design concerned with determining gradient.

**VERTICAL CURVE** Used to provide smooth transition between different gradients of road. They should be sufficiently long to provide good sight distance.

**VERTICAL CLEARANCE** An area or canopy above the trail that has been cleared of limbs, rock ledges and vegetation.

**VOLUME** The number of vehicles passing a given point during a specified period of time.

## **W**

**WASTE** Material from excavation not used in construction.

**WATER TABLE** The elevation of the upper limit of the portion of the ground wholly saturated with water.

**WEARING COURSE** The top crust or surface of a road or pavement.

**WEEP HOLES** Openings left through retaining walls and abutments to permit ground water to drain and reduce pressure.

**WINDROW** Slash, logs, or other material piled in a continuous line to clear the intervening ground.

**WING WALL** An extension of the abutment to hold back the embankment.

**WIRE MESH** Series of wires welded or clipped together forming a sheet, used in concrete pavement.

**WORK ORDER** A written order, signed by the Engineer, of a contractual status requiring performance by the Contractor without negotiation of any sort.

**WORKING DRAWINGS** Stress sheets, shop drawings, erection plans, falsework plans, framework plans, cofferdam plans, bending diagrams for reinforcing steel, or any other supplementary data which the contractor is required to submit to the Engineer for approval.

**WORKING DAY** A calendar day, exclusive of Sundays and legal holidays of the State of Minnesota, on which weather and other conditions not under the control of the contractor are such that, in the opinion of the Engineer, the contractor can effectively prosecute the operations which at that time control the progress of the work.

**Z**

**ZONING** The division of an area into districts and the public regulation of the character and intensity of use of the land and improvements thereon.

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ABBREVIATIONS

A Acre, Angle  
 AASHTO American Association of State Highway and Transportation Officials  
 ABUT Abutment  
 ADJ Adjusted  
 AGG Aggregate  
 APP Approach  
 APR Apron  
 APPROX Approximate  
 ASME American Society of Mechanical Engineers  
 ASTM American Society for Testing and Material Bureau  
 AWPB American Wood Preservers  
 AZ Azimuth  
  
 BAL Balance  
 BE Boxelder  
 BEG Begin  
 BET Between  
 BIT Bituminous  
 BLDG Building  
  
 BM Bench Mark  
 BORR Borrow  
 BRW Base of Rail  
 BS Back Sight  
  
 C Curve, Cut  
 CAR County Aid Road  
 CB Catch Basin  
 CTOC Center to Center  
 C&G Curb & Gutter  
 CEM Cementary, Cement  
 CFS Cubic Feet per Second  
 CHAN Channel  
 CHG Change  
 CIA Center Island  
 CIP Cast Iron Pipe  
 CL Centerline  
 CLR Clear  
 CMP Corrugated Metal Pipe  
 CMP-A Corrugated Metal Pipe Arch  
 CO County  
 COMP Compact  
 CONC Concrete  
 CONN Connection  
 CONST Construction

COR Corner  
 CO RD County Road  
 CP Cattle Pass  
 CRK Creek  
 CS Curve Spiral  
 CTWD Cottonwood  
 CU FT Cubic Feet  
 CY Cubic Yard  
 CULV Culvert  
 CULT Cultivated Field  
  
 D Degree of Curve  
 D BLK Ditch Block  
 DEP Departure  
 DES Design, Desirable  
 DG Ditch Grade  
 DI Drop Inlet  
 DIFF Difference  
 DIST Distance, District  
 DIV Division  
 DR Drive, Drainage  
 DRWY Driveway  
  
 E External Distance, East  
 E Rate of Superelevation  
 EBL East Bound Lane  
 EL Elevation  
 EMB Embankment  
 ENG Engineer  
 ENT Entrance  
 EQUA Equation  
 ER Edge of Road  
 EST Estimate  
 EXC Excavation  
 EXP Expansion  
 EXT Extention  
  
 FA Federal Aid  
 FAI Federal Aid Interstate  
 FAP Federal Aid Primary  
 FAS Federal Aid Secondary  
 FAU Federal Aid Urban  
 FD'N Foundation  
 FE Fence  
 F E Field Entrance  
 FE COR Fence Corner  
 FED Federal  
 FED. Spec. or FS Federal Specifications

F&I	Furnish and Install	L	Length of Curve
FL	Floor, Flume	LAB	Laboratory
FL	Flow Line	LAT	Latitude
FM E	Farm Entrance	LB	Pound
FP	Fence Post	LIN	Linear
F R	Frontage Road	LO	Level Out
FR	Frame	LOR	Line - Office Revision
FS	Fore Sight	LOS	Length of Offset
			Spiral
FSS	Federal Specifications and Standards	LT	Left
		LW	Low Water
		M	Maximum Offset
			(Vertical Curve)
FT	Foot		Middle Ordinate
FTG	Footing		(Circular Curve)
FWD	Forward	MAG	Magnetic
		MAINT	Maintenance
GAL	Gallon	MAT'L	Material
GALV	Galvanized	MAS	Masonry
GAR	Garage	MAX	Maximum
GEN	General	MH	Manhole
GP	Guy Pole	MI	Mile
GR	Gravel, Grub	MIN	Minimum
G R	Guard Rail	MICS	Miscellaneous
GRAN	Granular	ML	Match Line, Median
GSA	General Services Administration		Line
		MON	Monument
H	Haul	MPH	Miles Per Hour
HDWL	Headwall	MSHA	Mine Safety and
HI	Height of Instrument		Health Administration
HO	House	N	North
Horiz	Horizontal	NBL	North Bound Lane
HT	Height	N&D	Nail and Disk
HW	High Water	NE	North East
HWY	Highway	NFPA	National Fire
HYD	Hydrant		Protection Association
H2O	Water	NFPA	National Forest
			Products Association
IH	Interstate Highway	NO	Number
INCL	Included	NW	Normal Water, North
INFO	Information		West
INL	Inlet	OBLIT	Obliterate
INP	Inplace	OSHA	Occupational Safety
INST	Install		and Health Act
INV	Invert	OUT	Outlet
IP	Iron Pipe		
		P	Place
JCT	Junction	PAV'T	Pavement
		Point of Curvature	(Beginning of Curve)
K			

PGC	Point of Compound Curve	SF	Story Frame
PE	Project Engineer Professional Engineer	S-G	Sand and Gravel
PERF	Perforated	SHLD	Shoulder
PI	Point of Intersection	SO VALVE	Shut Off Valve
PI	Plasticity Index	SP	State Project
PL	Plate	SP	Special
POC	Point on Curve	SPEC	Specification, Special
POP	Popular	SPK	Spike
POST	Point on Semi Tangent	SQ YD	Square Yard
POT	Point on Tangent	S T	Spiral Tangent
PP	Power Pole	ST	Street, Stone, Steel, Stucco, State
PRC	Point of Reverse Curve	STA	Station
PROJ	Project	STD	Standard
PROP	Property	STK	Stake
PROV	Provisions	STP	Stump
PS	Product Standard issued by U.S. Department of Commerce	STRUCT	Structure
PT	Point of Tangency (End of Curve)	SUPER	Superelevation
PT	Point	SURF	Surface
Q=	Discharge cfs.	S W	Sidewalk, South West
QUANT	Quantity	TAN	Tangent
R	Radius, Range Rock	TEMP CONN	Temporary Connection
RCP	Reinforced Concrete Pipe	T H	Trunk Highway
RCCP	Reinforced Concrete Culvert Pipe	TOPOG	Topography
RD	Road	T P	Telephone Pole, Turning Point
RDWY	Roadway	TR	Tree, Trench (Track)
REF	Reference	T S	Tangent to Spiral, Topsoil
REINF	Reinforced	TS=	Tangent distance (Transitioned Curve)
RET	Retaining Wall	TTH	Temporary Truck Highway
REV	Revise	TWP	Township
R R	Railroad	UL	Underwriter's Laboratories, Inc.
RT	Right	UNADJ	Unadjusted
ROW R/W	Right of Way	SALV	Salvaged
RY	Railway	VAR	Variable
S	South, Sand	V C	Verticle Curve
SAN	Sanitary	VERT	Verticle
SAR	State Aid Road	VIT	Vitrified
SC	Spiral to Curve	V M	Vehicular Measure
SBL	South Bound Lane	W	West, Water
SCP	Sectional Concrete Pipe	W B L	West Bound Lane
SCP-A	Sectional Concrete Pipe Arch	WCLIB	West Coast Lumber
SD	Service Drive		
SE	South East		



# STATE FOREST ROAD MANUAL

SEE	Section	Inspection Association
WWPA	Western Wood Products Association	
X-SECT	Cross Section	
X-RD	Cross Road	
X-OVER	Cross Over	
YD	Yard	

