

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

WINDBREAK/SHELTERBELT RENOVATION

(Feet)
CODE 650

DEFINITION

Widening, partial replanting, releasing, removing and replacing selected trees and shrubs to improve an existing windbreak or shelterbelt.

PURPOSE

- Restoring or enhancing the function of existing windbreaks or shelterbelts.

CONDITIONS WHERE PRACTICE APPLIES

In any windbreak or shelterbelt that is no longer functioning properly for the intended purpose.

PLANNING CONSIDERATIONS

Renovation may involve a combination of actions to restore or create the proper spacing, density, structure, and species composition in a windbreak/shelterbelt. The main consideration in developing a renovation plan is determining the reason the existing windbreak is deteriorating or lacking in vigor. The need for renovation may be due to the lack of maintenance, livestock grazing, insect or disease infestation, drought, herbicide drift damage, excessive vegetative competition, or poor design including species not adapted to the site and close spacing.

Renovation should not be initiated without an adequate inventory and evaluation of the existing windbreak/shelterbelt.

CRITERIA

- All renovation activity must account for the change in the resulting snow drift pattern, its impact on the residual or replaced plants and any structures or areas needing protection from blowing and drifting snow.
- Renovation plans shall result in plantings which achieve the minimum design density necessary to accomplish the intended purpose and function

of the Windbreak/shelterbelt. NRCS standard WINDBREAK/SHELTERBELT ESTABLISHMENT (380) contains the density requirements for windbreaks.

- Whenever possible, the minimum design density should be maintained during renovation activities.
- All woody vegetation and other debris which could interfere with new planting and maintenance operations will be removed and disposed of prior to planting.
- Removal of woody vegetation may be accomplished by any means which does not damage the trees and shrubs to be retained or cause adverse off-site impacts.
- All woody vegetation to be removed will be clearly designated or marked using paint, flagging or other methods prior to removal.
- Disposal of woody vegetation and debris (including burning) shall be done in compliance with state and local regulations.
- Renovation plans involving multiple activities should be appropriately scheduled. All actions don't have to occur at the same time or in a single year.
- Renovation plans which involve the replacement or planting of new trees and shrubs will 1) use appropriate species, 2) use acceptable planting stock, 3) use appropriate planting methods, and 4) have planting sites properly prepared following the guidelines in NRCS standard WINDBREAK/SHELTERBELT ESTABLISHMENT (380).
- All nursery stock planted in Minnesota must be certified to be free of insects and diseases within the preceding 12 months. The MN Department of Agriculture is the responsible agency to certify nursery stock under the plant pest act.

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Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

- If pesticides are used, apply only when needed and handle and dispose of properly and within federal, state, and local regulations. Follow label directions and precautions listed on containers.

The following criteria will be used individually or in combination to accomplish windbreak or shelterbelt renovation.

I. THINNING, BRANCH PRUNING, COPPICING

A. THINNING

- Thinning is the removal or killing of entire trees or shrubs within a row or an entire row. Individual trees or shrubs will be identified for thinning to reduce plant competition, alter the density of the planting, or improve the growth of the remaining trees.
- Trees and/or shrubs may be thinned not to exceed the row-to-row spacing and plant-to-plant spacing guidelines in NRCS standard WINDBREAK/SHELTERBELT ESTABLISHMENT (380).
- Thinning should favor either 1) those plants which have the most vigor, 2) those species (including natural regeneration) which respond to release, or 3) those species which will best perform the desired function of the barrier.
- Thinning of some plants (mainly shrubs and deciduous trees) by cutting at the base may result in basal sprouting. Where sprouting is not desired, an appropriate herbicide should be applied to the stump to kill the plant.

B. BRANCH PRUNING

- Branch pruning is the removal of selected parts from trees and shrubs. Pruning of plants will be used to 1) remove diseased branches, 2) alter the density of the planting, 3) remove a safety hazard, 4) improve the appearance or function of the plant, 5) improve the quality of potential future wood products, 6) reduce competition with adjacent plants.
- Pruning of certain deciduous tree species may result in epicormic branching (the new lateral branch growth from dormant buds beneath the bark). Epicormic branching will increase the

density of the barrier and can lower the quality of future wood products cut from trees.

- Where wind erosion control is a desired function of the barrier, do not prune above a height 4.5 feet from the ground.
- Pruning activities will be conducted according to guidelines in NRCS standard TREE/SHRUB PRUNING (660A).

C. COPPICING

- Coppicing is the cutting of deciduous trees and shrubs at their base and the resulting regrowth from root or stump sprouts. Coppicing is most effective where an increase in the ground level density of the barrier is desired.
- Where a deciduous shrub row has become leggy and a more dense barrier is desirable, cut the shrubs back to within 4 to 8 inches above the ground.

II. ROOT PRUNING

- Root pruning is the severing of tree and shrub roots and is done to reduce adverse competition between existing rows and newly planted rows or between windbreak/shelterbelts and adjacent crops.
- Root prune trees and shrubs no closer than their canopy drip line.
- Only one side of any row will be root pruned per year.
- Root prune to a depth of 18 to 24 inches by pulling a vertical blade or plow through the soil.
- Repeat root pruning as necessary at intervals of 5 to 10 years.
- The optimum time for root pruning is when the plants are dormant.
- Cultivation over the plowed furrow may be necessary to prevent suckering from the severed roots of certain species.
- Locate all buried utilities prior to root pruning.

III. REINFORCEMENT PLANTING

A. INTERPLANTING

- Interplanting is the replacement or establishment of new trees and shrubs within or between established rows. This renovation method is used to fill in gaps or increase the barrier density while retaining the location of the original planting.
- In multiple row plantings where row removal and replacement will be done, it be necessary to remove 2 existing rows for every row to be replanted.
- This renovation method is the most difficult to successfully achieve. The replacement species selected must be capable of handling competition from existing trees and shrubs for light and moisture. Where appropriate, some species to favor include eastern red cedar, ponderosa pine and shade tolerant shrubs.
- Interplanted trees and shrubs may need supplemental water.

B. SUPPLEMENTAL OR ENLARGEMENT PLANTING

- Supplemental row plantings will not be closer than 30 feet to existing rows of large spreading trees such as cottonwood, Siberian elm, silver maple, or a spreading, suckering shrub row.
- All other supplemental row plantings will not be closer than 20 feet to existing rows.
- Spacing for supplemental rows can be closer than listed above if the renovation plan includes eventual removal of the adjacent row prior to suppressing the newly planted row.

IV. RELEASE

A. SOD-BOUND PLANTINGS

- When competing herbaceous vegetation is affecting the health of the planting, the trees or shrubs will be released mechanically or chemically to improve their growth and vigor.
- When mechanical release is conducted, cultivate no deeper than 3 inches between the rows and no closer than 1 foot from the base of plants.

B. NATURAL REGENERATION

- Older, multiple row plantings may have trees and shrubs naturally reproducing under the main canopy. Renovation plans can be designed to release this new growth.
- When possible, release of natural reproduction can be done in rows to conform with a windbreak design or managed similar to a natural forest using timber stand improvement techniques.

CONSIDERATIONS

A. FOR FIELD WINDBREAKS

- If trees are spaced closer than 10 to 12 feet and are in otherwise good condition consider thinning the windbreak by removing every other tree.
- If an existing single row windbreak has deteriorated beyond renovation (replacement) consider temporarily leaving the existing row and

1) on an East-West windbreak plant a new row to the north.

2) on a North-South windbreak plant a new row to the east and thin the existing row to a density less than 35%.

These actions will help protect the new row from desiccating summer winds and provide additional soil moisture through snow melt without piling damaging, drifting snow on the new planting. The old row should be removed either after the new row is well established or when the new row is performing the desired purpose.

- If the existing windbreak has an alternate tree-shrub design, consider removing the shrubs for more uniform snow distribution and release of the trees.

B. FOR FARMSTEAD SHELTERBELTS

- Make every effort possible to save existing dense conifers (spruce and cedar species). When possible consider realigning conifers with a tree spade to create a better spacing.
- Consider establishing and maintaining at least three rows of dense conifers.

- Consider removing any row of deciduous trees if it may crowd, overtop, or suppress an adjacent conifer row.
- Consider thinning the shrub row if it is located upwind of newly planted conifers and can cause damaging snow drifts on the trees.

C. FOR ALL PLANTINGS

- Older age and medium to larger size planting stock, including bare rooted, transplanted, balled and burlapped and container grown stock, are recommended in single row and minimum design renovated windbreaks. Death loss is more critical in these designs and larger and older planting stock may provide an advantage in survival rates.
- Consider shade tolerance when selecting species for replanting within or adjacent to an existing windbreak/shelterbelt.
- Favor the use of seedlings which have a known seed source. The Minnesota Crop Improvement Association (MCIA) conducts a program to certify seed sources. Refer to Plant Materials Technical note #4 for information on certified seedlings.
- Spacing of rows within a windbreak may be adjusted, within limits, to accommodate mechanical cultivation equipment.
- Selection of plants for use in windbreaks should favor species or varieties tolerant to herbicides used on agricultural land in the area.
- Plants which may be alternate hosts to undesirable pests should be avoided.
- All plantings should complement natural features.
- Where water erosion and/or runoff from melting snow is a hazard, it should be controlled by supporting practices.
- Wildlife needs should be considered when selecting tree or shrub species. Refer to Biology Technical Note #4 for wildlife habitat assessment guides for windbreaks/shelterbelts.
- Species diversity should be considered to avoid loss of function due to species specific pests.

- If appropriate, consider and encourage the use of native species. Do not favor native species if they are not capable of providing the designed windbreak function. Refer to NRCS standard WILDLIFE UPLAND HABITAT MANAGEMENT (645) for information on native species.
- Consideration should be given to adverse offsite effects.

PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site. Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan or other acceptable documentation.

These documents are to specify the requirements for installing the practice, such as the kind, amount or quality of materials to be used, or the timing or sequence of installation activities. Requirements for operation and maintenance of the practice shall be incorporated into site specifications.

OPERATION AND MAINTENANCE

The following actions shall be carried out to insure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation) and repair and upkeep of the practice (maintenance):

From a maintenance standpoint, treat all renovation plantings like newly established windbreaks.

Replacement of dead trees or shrubs will be continued until the barrier is functional.

Vegetative competition will be controlled.

Thin the barrier to maintain its function.

Supplemental water will be provided as needed.

Damaging pests will be monitored and controlled. Repellents, poisons, tubing, netting and cages of various kinds may be needed to control rodents and animal damage. Periodic applications of nutrients may be needed to maintain plant vigor.

Refer to NRCS standard 612, TREE PLANTING for additional information on the age, size, handling, storage and quality of planting stock.

Livestock shall be controlled or excluded as necessary to achieve and maintain the intended purpose. Refer to NRCS standards 472, USE EXCLUSION or 382, FENCING for exclusion techniques.

Harmful pests present on the site shall be controlled or eliminated as necessary.

The windbreak will be inspected periodically, protected and restored as needed from adverse impacts such as pest infestations, pesticide use on adjacent lands, livestock use, excessive traffic under the canopy, and fire.

As applicable, control of wind or concentrated flow erosion shall be continued in the area up-wind or up-gradient of the windbreak to maintain its function. Following severe storms check for evidence of sediment deposit, erosion or concentrated flow channels. Prompt corrective action needs to be taken to stop erosion.

Maintain central stem on trees by eliminating weak union forks and multiple leaders.

REFERENCES

Brandle, J. and Nickerson, H., 1997 Windbreaks for Snow Management. University of NE, Lincoln, NE.

Eiber, T.E., 1996. The Ecology and Management of Windbreaks in Minnesota. Presented at Windbreak Renovation Training, Willmar, MN.

MN Inter-agency Living Snowfence Task Force, 1997. Proceedings from Living Snowfence Symposium, Alexandria, MN.

Scholten, H.S., 1989. Field Windbreaks. University of MN NR-FO-0824, St. Paul, MN.

Scholten, H.S., 1988. Farmstead Shelterbelts - Protection Against Wind and Snow. University of MN BU-0468, St. Paul, MN.

Scholten, H.S., 1991. Minnesota Perspective on Windbreak Renovation. Presented at Windbreak Renovation Training, Marshall, MN.

Stange, Craig, 1997. Windbreak Renovation. Draft paper prepared for USDA/NRCS employee use.

USDA, NRCS Windbreaks for Conservation, 1997. Agriculture Information Bulletin 339.

USDA, NRCS Windbreak Technology, 1997. NEDC Training Course Handbook, Ft. Worth, TX.

Wight, Bruce and Kuhn, Gary, 1991. Basic Principles of Renovation. Presented at Windbreak Renovation Training, Marshall, MN.