CONTENTS

Executive Summary ......................................................... 1

Background
Issue ............................................................................. 1
Task Force ....................................................................... 1
Activities ........................................................................ 2
Philosophy ....................................................................... 3

General
Findings and Current Practice ........................................... 5
Conclusions ...................................................................... 5
Recommendation 1 .......................................................... 5

Base and Drainage
Findings and Current Practice ........................................... 7
Conclusions ...................................................................... 8
Recommendations 2 - 5 .................................................... 8

Concrete
Findings and Current Practice ........................................... 11
Conclusions ...................................................................... 12
Recommendation 6 .......................................................... 12

Bituminous
Findings and Current Practice ........................................... 13
Conclusions ...................................................................... 13
Recommendations 7 - 8 .................................................... 14

Recyclable Material Utilization
Findings and Current Practice ........................................... 15
Conclusions ...................................................................... 15
Recommendations 9 - 12 .................................................. 15

Suggested Uses of Salvaged Concrete and Bituminous Material. ......................................................... 17
EXECUTIVE SUMMARY

Background

Environmental concerns, restrictions by local units of government regarding stockpiles, and increasing costs of disposal of excess material in landfills prompted the State Construction Engineer and the Director of the Office of Materials and Research to appoint a 15-member task force to investigate possible uses of salvage material, such as bituminous and concrete, from construction projects. The task force sought input from the bituminous, concrete, aggregate, and construction industries and researched the Mn/DOT Standard Specifications for Construction to identify allowable, restricted, and prohibited uses.

The task force, as a group, unanimously agreed that Mn/DOT should:

- Strongly encourage recycling surplus material.
- Strongly discourage burying recyclable material.
- Encourage specification changes to allow increased use of recyclable material.
- Be committed to increasing awareness of uses for recyclable material.

Recommendations

After gathering and analyzing input and information, the task force agreed on twelve recommendations, one general and the others specific to base and drainage, concrete, bituminous, and recyclable material utilization. The task force recommends that:

General

1. A prioritized list of options for use of salvaged concrete and bituminous materials back into the road project be included in each set of plans or special provisions, and that design engineers make every effort possible to permit recycled materials to be utilized on the project to the maximum extent permitted by the specifications.

Base and Drainage

2. Mn/DOT 3138.2A be revised to provide that bitumen content of the composite material be increased from 2 percent to 3 percent by weight (as determined by AASHTO T 164), except that the limitation will not apply when salvage bituminous material is used as a surfacing aggregate.
3. Mn/DOT 3149.2 be revised to provide that bitumen content of the composite material be increased from 2 percent to 3 percent by weight (as determined by AASHTO T 164).

4. A composite bituminous mixture with a bitumen content not exceeding 3 percent may be used without restriction as related to subsurface drains for both Mn/DOT 3138 and Mn/DOT 3149 applications, except for use as a filter aggregate (Mn/DOT 3149.2H and Mn/DOT 3149.2J).

5. Unless otherwise permitted, such as for stabilizing aggregate, crushed concrete may not be used for either base (Mn/DOT 3138) or granular material (Mn/DOT 3149) adjacent to any subsurface drainage system and/or perforated pipe installation, nor may it be used in a location where water feeding through such material would ultimately enter a subsurface drainage system and/or perforated pipe. Permitted exceptions are as follows:

a. A composite mixture containing up to 15 percent by weight of crushed concrete, all of which is retained on the No. 4 sieve, may be used in either Mn/DOT 3138 or Mn/DOT 3149 applications, except for use as filter aggregate (Mn/DOT 3149.2H and Mn/DOT 3149.2J).

b. Crushed concrete may be used below any drainage system unless specifically prohibited.

c. Crushed concrete may be used as granular material (Mn/DOT 3149) above a drainage system, provided that the minimum particle size is 2 inches, other granular material is incorporated to meet density requirements, and all gradation specifications are met. No pieces of concrete larger than 2 inches may be placed within 2 feet of any subsurface drain to be placed by machine trencher.

d. A composite aggregate mixture that contains crushed concrete may be used as stabilizing aggregate (Mn/DOT 3149), provided that the application rate does not exceed the equivalent of 300 pounds (approximately 3 inches) of crushed concrete per square yard and the mixture is incorporated (mixed) into the upper portion of the subgrade. Example: maximum application rate of 100 percent crushed concrete is 300 pounds per square yard; maximum application rate of a 50-50 crushed concrete/aggregate mixture is 600 pounds per square yard.
e. A composite aggregate mixture that contains up to 100 percent crushed concrete may be used as base aggregate (Mn/DOT 3138), provided that the thickness does not exceed 3 inches and the base is being placed in lieu of stabilizing aggregate (Mn/DOT 3149) over a granular material subgrade. If crushed concrete mixtures are used as both stabilizing aggregate and base aggregate in the same location, the total application rate shall not exceed the equivalent of 3 inches (approximately 300 pounds per square yard) of crushed concrete.

f. One hundred percent crushed concrete may be used as surface and base courses in shoulder areas, even in locations where pavement edge drains or subcut drains are in place.

Concrete

6. Mn/DOT 3137.2B5 be revised to provide that the original source of the recycled concrete aggregate must be known, except when used in minor structures such as sidewalks, median barriers, light standards, and curbs and gutters, so the Engineer can determine its suitability for the intended use.

Bituminous

7. The Office of Materials and Research collect current state-of-the-practice information on cold in-place recycling from states with ongoing programs as well as from pilot projects in Minnesota; assess local design and construction variables such as soils, traffic, and climate; and determine whether this technique can successfully be used by Mn/DOT, counties, and/or cities.

8. The percentage of salvaged material permitted in bituminous mixtures not be increased at the present time.

Recyclable Material Utilization

9. Project plans and special provisions specify, whenever possible and within specification requirements, that all salvaged materials be used (in priority order):

   a. In the new construction.
   b. On other ongoing projects.

10. The contractor continue to retain ownership of the salvaged bituminous and concrete material and be strongly encouraged to use it to the extent possible and within the specifications.
11. The effectiveness of these guidelines in promoting and encouraging the utilization of salvage concrete and bituminous materials be evaluated in the near future. Based on the findings of that evaluation, which would include comments/concerns received, these guidelines be modified as necessary to address the respective deficiencies of the guideline and to reflect Mn/DOT's current position on promoting the utilization of salvage road materials back into road construction projects.

12. Counties and municipalities, etc., be informed of the acceptable uses of salvage concrete and bituminous materials and the corresponding specifications. These units of government be encouraged to recycle materials back into their respective road construction projects to the maximum extent permitted by Mn/DOT specifications.

Note

Note that this report does not require that all materials be recycled, but is only advisory. The report does not preclude individual districts or other units of government from modifying these guidelines so as to ensure and/or encourage the utilization of the various salvage materials back into a given project. The extent of any modifications to the guidelines should be as dictated by local needs, experiences, and/or requirements.
BACKGROUND

Issue

Mn/DOT construction projects costing between $300 and $400 million are under way every year. Approximately $100 million of that cost is for pavement surfacing in reconstructing, reconditioning, and resurfacing trunk highways. These activities create large quantities of salvaged bituminous, concrete, and other material. While a significant amount is currently recycled back into the pavement structure as base and surfacing, most of the excess is stockpiled for future use or buried in landfills. A recent survey indicated that approximately 600,000 tons of bituminous material and 300,000 tons of concrete material are stockpiled throughout Minnesota. This estimate, regarded by many to be conservative, does not include material from city or county projects.

With many counties now contemplating or already prohibiting additional stockpiles, and with environmental considerations and dumping fees virtually excluding the use of landfills for the surplus material, disposal of salvaged material is becoming an increasing problem. As projects continue to be let and constructed, the situation will place a growing burden on Mn/DOT and the construction industry to use all salvaged material.

Task Force

To address this issue, the State Construction Engineer and the Director of the Office of Materials and Research, in May 1990, appointed a Salvage Materials Task Force and charged it to:

- Investigate possible uses of salvage material in construction projects, such as in subbase or base, select granular, and subcut backfill, and to consider the possibility that the volume of salvage material may require grade raises, temporary stockpiles for use on other Mn/DOT or city or county projects, a change in Mn/DOT specifications to allow use of a greater percentage of salvage in surfacing, or other such measures.
The task force membership included:

Gerald Rohrbach, Chair, Pavement Engineer
Art Bolland, Materials Engineer, Willmar
Bob Cartford, Pre-Letting Engineer
Rudy Ford, Senior Geologist
Don Johnson, District Design Engineer, Oakdale
Gerald Kreutzer, Assistant District Engineer, Brainerd
Henry Mehmen, Grading and Base Engineer
Jim Miner, Maintenance Engineer, Virginia
Mike Robinson, Materials Engineer, Golden Valley
Dan Schiefert, District Design Engineer, Rochester
Doug Schwartz, Bituminous Engineer
Jim Swanson, Assistant District Engineer, Mankato
Gary Thompson, Resident Engineer, Golden Valley
Duane Young, Pavement Design Engineer
Terry Zoller, Concrete Engineer

This task force, while large, represented a cross section of the functional areas that could be affected by its recommendations.

Activities

To solicit the thoughts, suggestions, and concerns of various stakeholders, the task force invited to one of its regular meetings representatives of:

- The bituminous industry (Minnesota Asphalt Pavers Association and Asphalt Institute)
- The concrete industry (Concrete Paving Association of Minnesota)
- The Associated General Contractors Grading Committee
- Aggregate producers
- Various contractors

The task force also established four subcommittees to identify current Mn/DOT Standard Specifications for Construction restrictions on recycling salvaged material back into the pavement structure, and to suggest modifications to the specifications to permit increased and additional uses of the salvage materials. Topics the subcommittees addressed were:

- Base and drainage
- Bituminous
- Concrete
- Recyclable material utilization
Philosophy

The full task force discussed the subcommittees’ findings and suggestions, reviewed all of the information and input it had gathered, and unanimously concluded that Mn/DOT should:

- Strongly encourage recycling surplus material.
- Strongly discourage burying recyclable material.
- Encourage specification changes to allow increased use of recyclable material.
- Be committed to increasing awareness of uses for recyclable material.

This, then, became the task force’s underlying philosophy as it proceeded to develop its recommendations.

Note that this report does not require that all materials be recycled, but is only advisory. The report does not preclude individual districts or other units of government from modifying these guidelines so as to ensure and/or encourage the utilization of the various salvage materials back into a given project. The extent of any modifications to the guidelines should be as dictated by local needs, experiences, and/or requirements.
Findings and Current Practice

*Mn/DOT Standard Specifications for Construction*, 1405 (Mn/DOT 1405), "Use of Materials Found on the Project," states that, "The use of acceptable material found on the project may be authorized by the engineer as a substitute for material that would otherwise have to be furnished by the contractor from outside sources at his expense."

*Mn/DOT 2105.2C, "Salvage Material," defines salvaged material as "...material available on the project, such as aggregates in existing pavement and base courses, which is to be reserved for a specific use, either in the work under contract or in future construction. It further states that the salvaged material shall be stockpiled for future use or utilized in the new construction as indicated in the plans."

Conclusions

The overall conclusion of the task force is that the current specifications encourage the utilization of salvage materials back into the roadway projects. Therefore, it is of prime importance to:

- Recycle as much surplus material as possible.
- Bury as little surplus material as possible.
- Revise specifications wherever possible to allow increased use of recyclable material.
- Increase awareness of the many uses for recyclable material.

Therefore, the task force recommends that:

Recommendation 1. A prioritized list of options for use of salvaged concrete and bituminous materials back into the road project be included in each set of plans or special provisions, and that design engineers make every effort possible to permit recycled materials to be utilized on the project to the maximum extent permitted by the specifications.
Special provisions issued in August 1981 first allowed crushed concrete and salvaged bituminous mixture in aggregate base and surfacing and as granular material. The interest at that time was primarily in using the material for economic advantage without sacrificing quality and performance, although conservation of materials and environmental concerns were also considered.

Mn/DOT 3138.2A, "Composition of Aggregates," specifically allows the use of crushed concrete and salvaged bituminous mixture in aggregates for surface and base courses. This same section, however, limits the bitumen content to 2 percent by weight.

When the 2 percent limitation on bitumen content was established, the purposes were: to ensure that the embankment and base could be constructed and tested in the same manner as when using conventional materials, to encourage the highest and best use of asphalt materials, and to address concerns relative to the possibility of creating impermeable layers in the pavement structure if a higher percentage of bitumen were permitted.

The first paragraph of Mn/DOT 3149.2, "Granular Material Requirements," specifically allows crushed concrete and salvaged bituminous mixture for use as granular material such as granular borrow and select granular borrow. The same 2 percent bitumen content limitation cited above is stipulated.

The second paragraph of Mn/DOT 3149.2, "Granular Material Requirements," prohibits the use of crushed concrete and salvaged bituminous mixture in sites where water feeding through such material would ultimately enter a subsurface drainage system or perforated pipe. This is necessary to prevent moving water from leaching cement fines from the material and depositing them where they may clog the subsurface drainage system. This same prohibition applies to Mn/DOT 3138.2A by special provision.

Based on current review, the potential for clogging subsurface drain systems with migrating bitumen products is considered to be remote, and therefore the use of such materials in proximity to drains should no longer be restricted except as indicated below for filter aggregates. Concerns continue to exist, however, regarding clogging at drains by
crushed concrete products, and major changes in the use of such materials in proximity to drains are not suggested at this time. Two research projects (I 35 at Lakeville and Trunk Highway (TH) 15, Dassel to Hutchinson) are currently underway to help clarify future specification changes in relation to the use of both crushed concrete and bituminous mixtures in proximity to drains.

Under Mn/DOT 3149.2H, "Coarse Filter Aggregate," and Mn/DOT 3149.2J, "Fine Filter Aggregate," the use of crushed concrete and salvaged bituminous mixture is specifically prohibited. Further, Mn/DOT 3149.2K, "Sand Cover," requires the use of sand or gravel for sand cover material. No changes should be made in these specifications.

In general, Mn/DOT 2105, "Excavation and Embankment," restricts the size of the crushed concrete and salvaged bituminous fragments to 6 inches in the top 3 feet of the roadbed embankment, except that, in the upper 6 inches of the roadbed embankment and within 18 inches of a structure, the maximum size is 3 inches.

Conclusions

The consensus of the task force is that utilizing salvaged bituminous and/or crushed concrete mixtures to a greater extent than in the past in construction or reconstruction of roadways is a highly desired goal. Thus, it concluded that the 2 percent bitumen maximum should be increased to 3 percent, the prohibition on salvaged bituminous mixture adjacent to subsurface drainage systems should be removed, and modifications to the special provisions should be made. Accordingly, the task force recommends that:

Recommendation 2. Mn/DOT 3138.2A be revised to provide that bitumen content of the composite material be increased from 2 percent to 3 percent by weight (as determined by AASHTO T 164), except that the limitation will not apply when salvage bituminous material is used as a surfacing aggregate.

Recommendation 3. Mn/DOT 3149.2 be revised to provide that bitumen content of the composite material be increased from 2 percent to 3 percent by weight (as determined by AASHTO T 164).
Recommendation 4. A composite bituminous mixture with a bitumen content not exceeding 3 percent may be used without restriction as related to subsurface drains for both Mn/DOT 3138 and Mn/DOT 3149 applications, except for use as a filter aggregate (Mn/DOT 3149.2H and Mn/DOT 3149.2J).

Recommendation 5. Unless otherwise permitted, such as for stabilizing aggregate, crushed concrete may not be used for either base (Mn/DOT 3138) or granular material (Mn/DOT 3149) adjacent to any subsurface drainage system and/or perforated pipe installation, nor may it be used in a location where water feeding through such material would ultimately enter a subsurface drainage system and/or perforated pipe. Permitted exceptions are as follows:

a. A composite mixture containing up to 15 percent by weight of crushed concrete, all of which is retained on the No. 4 sieve, may be used in either Mn/DOT 3138 or Mn/DOT 3149 applications, except for use as filter aggregate (Mn/DOT 3149.2H and Mn/DOT 3149.2J).

b. Crushed concrete may be used below any drainage system unless specifically prohibited.

c. Crushed concrete may be used as granular material (Mn/DOT 3149) above the drainage system, provided that the minimum particle size is 2 inches, other granular material is incorporated to meet density requirements, and all gradation specifications are met. No pieces of concrete larger than 2 inches may be placed within 2 feet of any subsurface drain to be placed by machine trencher.

d. A composite aggregate mixture that contains crushed concrete may be used as stabilizing aggregate (Mn/DOT 3149), provided that the application rate does not exceed the equivalent of 300 pounds (approximately 3 inches) of crushed concrete per square yard and the mixture is incorporated (mixed) into the upper portion of the subgrade. Example: maximum application rate of 100 percent crushed concrete is 300 pounds per square yard; maximum application rate of a 50-50 crushed concrete/aggregate mixture is 600 pounds per square yard.
e. A composite aggregate mixture that contains up to 100 percent crushed concrete may be used as base aggregate (Mn/DOT 3138), provided that the thickness does not exceed 3 inches and the base is being placed in lieu of stabilizing aggregate (Mn/DOT 3149) over a granular material subgrade. If crushed concrete mixtures are used as both stabilizing aggregate and base aggregate in the same location, the total application rate shall not exceed the equivalent of 3 inches (approximately 300 pounds per square yard) of crushed concrete.

f. One hundred percent crushed concrete may be used as surface and base courses in shoulder areas, even in locations where pavement edge drains or subcut drains are in place.
CONCRETE

Findings and Current Practice

Using recycled concrete has been permitted since 1979 when Mn/DOT first tried it in a section of TH 59 near Worthington. Since then, contractors have been given the option to recycle the in-place concrete pavement in reconstruction contracts, subject to the restrictions noted below, which exist to maintain the strength and protect the durability of major concrete structures.

Mn/DOT 2301.2A, "Concrete Pavement Materials," states that the use of recycled aggregate in concrete pavement is an option for a contractor who has the written approval of the engineer. This approval may only be given if the Concrete Engineer can adequately trace the source of the original coarse aggregate and determine that source to be satisfactory for the intended use.

Mn/DOT 3137.2B5, "Coarse Aggregate for Portland Cement Concrete, Class R," defines Class R aggregate as aggregate obtained from recycling concrete. It also stipulates that the original source of such aggregate must be known so the engineer can determine its suitability for the intended use.

This stipulation is to protect against failure in long-term durability, e.g., D-cracking, such as was prevalent before the 1970s, primarily in southern Minnesota. The use of recycled concrete as a concrete aggregate where the source is questionable may be allowed in minor structures, as determined by the Concrete Engineering Unit based on the expected performance requirements of the new structure. This option has always been allowed, but only recently have contractors chosen this alternative. It has proven successful, especially where a slipform operation is necessary and a stiffer mix desired.

Mn/DOT 3137.2B5, "Coarse Aggregate for Portland Cement Concrete, Class R," also prohibits the use of material that will pass through a No. 4 sieve. Laboratory tests on various mix designs have shown that when material this fine is used, the concrete is hard to work and requires more water, which requires more cement, which in turn may affect its ultimate strength.

Mn/DOT 2461.3D, "Cement Substitutions," specifies the use of fly ash or portland-pozzolan cement in lieu of portland cement for recycled concrete use.
The requirement to use fly ash was added after laboratory freezing and thawing experiments indicated that concrete performs better with fly ash than without.

Recycling concrete from non-pavement structures has been done on only a very limited basis. Crushing such concrete, separating the steel, maintaining control of the source, and using the recycled aggregate in small quantities has not proven to be cost effective.

**Conclusions**

The task force concluded that the specification that requires knowledge of the original source of salvaged concrete must be maintained for all major concrete structures.

The task force also concluded that the restriction on material that passes through the No. 4 sieve must continue to be applied because of concern for strength and placement. Further testing is required before modifications can be allowed. Material this fine, however, is well suited to stabilize weak subgrades and as an aggregate for bituminous mixtures.

Accordingly, the task force recommends that:

**Recommendation 6.** Mn/DOT 3137.2B5 be revised to provide that the original source of the recycled concrete aggregate must be known, except when used in minor structures such as sidewalks, median barriers, light standards, and curbs and gutters, so the Engineer can determine its suitability for the intended use.
BITUMINOUS

Findings and Current Practice

Under Mn/DOT 2331.1, "Plant-Mixed Bituminous Pavement," salvaged material may be used in bituminous mixtures. Salvaged asphaltic aggregate has been permitted since the mid 1970s. The percentages allowed are based on Mn/DOT’s experience with salvaged material and represent its confidence level in the contractor providing a quality bituminous mixture. In the past, as much as 70 percent salvaged material has been used, but poor contractor stockpiling and handling procedures, which cause unacceptable variability in the final bituminous mixture, have prompted Mn/DOT to limit the allowable percentages. Maximum percentages of various salvaged aggregates allowed are:

<table>
<thead>
<tr>
<th>Salvaged Material Types</th>
<th>Maximum Percentage Allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type 32 Mixtures</td>
</tr>
<tr>
<td></td>
<td>Non Shoulder</td>
</tr>
<tr>
<td></td>
<td>Wear</td>
</tr>
<tr>
<td>Salvaged Aggregate</td>
<td>100</td>
</tr>
<tr>
<td>Salvaged Asphaltic Pavement</td>
<td>50</td>
</tr>
<tr>
<td>Crushed Concrete</td>
<td>50</td>
</tr>
<tr>
<td>Salvaged Asphaltic Pavement and Crushed</td>
<td>85</td>
</tr>
<tr>
<td>Concrete Combination</td>
<td></td>
</tr>
</tbody>
</table>

* (Neither component shall exceed 50 percent of the total aggregate by weight.)

Non-traditional salvaged material, such as ground tires, asphalt shingles, sludge ash, and incinerator ash, are being studied for inclusion in bituminous mixtures. When research supports that these materials can be satisfactorily incorporated into bituminous pavement, they will be added to the salvaged material types listed in the above table.

Conclusions

The task force concluded that the percentages of salvaged material permitted in bituminous mixtures should not be increased at this time. When new technology is developed or handling procedures improve, as indicated by data from the Quality Management process, the percentages will be reviewed and appropriately adjusted.
Cold in-place recycling offers the option of reusing up to 100 percent of the in-place bituminous pavement. This involves pulverizing the in-place mat; crushing it to a maximum size; adding an asphalt emulsion, portland cement, water, or other stabilizing agent; and re-lying the material as a stabilized base.

While this is standard practice in some states, including Kansas, New Mexico, Pennsylvania, and Utah, in Minnesota cold in-place recycling has been limited to test-section construction, including a three-mile segment of TH 95 in 1989. Still in the experimental stage, this technique should be studied further.

Therefore, the task force recommends that:

**Recommendation 7.** The Office of Materials and Research collect current state-of-the-practice information on cold in-place recycling from states with ongoing programs as well as from pilot projects in Minnesota; assess local design and construction variables such as soils, traffic, and climate; and determine whether this technique can successfully be used by Mn/DOT, counties, and/or cities.

**Recommendation 8.** The percentage of salvaged material permitted in bituminous mixtures not be increased at the present time.
RECYCLABLE MATERIAL UTILIZATION

Findings and Current Practice

Mn/DOT has traditionally transferred ownership of excess construction material salvaged from a project, primarily bituminous and concrete, to the contractor when the construction plans have not specified the use of the material.

Ownership of salvaged material by the contractor allows him to use the material cost-effectively in any number of ways, from usage on the project from which they were generated to usage on other projects in the area, either current or future. This process, however, has also resulted in stockpiles of salvaged concrete and bituminous material for undetermined lengths of time.

The construction industry informed the task force that it favors contractor ownership and is willing to explore new areas for usage.

Conclusions

The consensus of the task force, after having reviewed this policy, is that contractor ownership of salvaged material has been effective in the past and should be continued. The task force also concludes that, in the interests of conservation of natural resources and minimization of excess material stockpiles and disposal costs, Mn/DOT should strongly encourage contractors to use salvageable materials from the project in the new construction and help increase contractors' awareness of the many recycling uses of salvaged material. Therefore the task force recommends that:

Recommendation 9. Project plans and special provisions specify, whenever possible and within specification requirements, that all salvaged materials be used (in priority order):

a. In the new construction.
b. On other ongoing projects.

Recommendation 10. The contractor continue to retain ownership of the salvaged bituminous and concrete material and be strongly encouraged to use it to the extent possible and within the specifications.
Recommendation 11. The effectiveness of these guidelines in promoting and encouraging the utilization of salvage concrete and bituminous materials be evaluated in the near future. Based on the findings of that evaluation, which would include comments/concerns received, these guidelines be modified as necessary to address the respective deficiencies of the guideline and to reflect Mn/DOT’s current position on promoting the utilization of salvage road materials back into road construction projects.

Recommendation 12. Counties and municipalities, etc., be informed of the acceptable uses of salvage concrete and bituminous materials and the corresponding specifications. These units of government be encouraged to recycle materials back into their respective road construction projects to the maximum extent permitted by Mn/DOT specifications.
### SUGGESTED USES OF SALVAGED CONCRETE AND BITUMINOUS MATERIAL

<table>
<thead>
<tr>
<th>Suggested Use</th>
<th>Priority</th>
<th>Bituminous</th>
<th>Concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recycle to:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bituminous hot mix</td>
<td>H</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Concrete pavement</td>
<td>H</td>
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<td>X</td>
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<tr>
<td>Misc. concrete structures</td>
<td>H</td>
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</tr>
<tr>
<td>Median barrier</td>
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<td>Pile fill</td>
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<td>Bituminous cold mix</td>
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<td>X</td>
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<tr>
<td>Base Material</td>
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<td>Shoulder</td>
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<td>Stabilized aggregate</td>
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<tr>
<td>Subgrade</td>
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<td>X</td>
</tr>
<tr>
<td>Pipe bedding</td>
<td>L</td>
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<td>X</td>
</tr>
<tr>
<td>Maintenance stockpile</td>
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<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Raise grade</td>
<td>L</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Widen grade and shoulder</td>
<td>L</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Future stockpile (dedicated to a project</td>
<td>M</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>for above items)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Surfacing aggregate</td>
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<td>Shoulder</td>
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</tr>
<tr>
<td>Driveway</td>
<td>M</td>
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<td>X</td>
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<td>Bike Path</td>
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<td>X</td>
</tr>
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<td>Trail</td>
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<tr>
<td>DNR boat ramp</td>
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<td>Township road</td>
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</tr>
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<td>Park and ride lot</td>
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<td>Erosion control (riprap)</td>
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<tr>
<td>Gravel pit reclamation</td>
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<td>X</td>
</tr>
<tr>
<td>Bury on/off job site</td>
<td>L</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Legend:**

- **H** = High
- **M** = Medium
- **L** = Low
- **X** = The salvage material is appropriate for the suggested use.

Highly recommended use of recyclable material.

Suggested use after consideration of H uses.

Suggested use only after H and M above have been considered and stockpiling is not feasible.

These suggested uses for salvaged concrete and bituminous materials are subject to the limitations, restrictions, and permitted uses in accordance with the applicable specifications, special provisions, and/or plan details.