U.S. EPA Region 8
Performance Standard Specifications and Guidelines for Industrial Materials

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U.S. EPA Region 8
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TABLE OF CONTENTS

U.S. EPA Region 8
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Background

The Resource Conservation Challenge (RCC) is a national effort to conserve natural resources and energy, and reduce greenhouse gas emissions (GHG) by managing materials more efficiently. Increasing the recycling and beneficial use of industrial materials is one of four national priority areas of the RCC.

Each year, industries generate well over 500 million tons of materials that are often wasted. EPA's Industrial Materials Recycling (IMR) Program was formed to develop and implement strategies to achieve the EPA's RCC goals to increase recycling and beneficial use of industrial materials. Industrial materials are nonhazardous industrial byproducts generated from industrial processes. These nonhazardous materials include foundry sands; coal combustion products such as fly ash, bottom ash, and gypsum; construction and demolition materials such as concrete, asphalt, and wood; and other materials such as slags, waste tires, and glass. These material byproducts can be used in many construction applications such as roads, buildings, bridges, and other construction projects. The goals of industrial materials recycling are to reduce waste at the source, promote waste recycling, and encourage beneficial use of waste in an environmentally sound manner.

There are many benefits for recycling industrial materials into construction applications. Substituting industrial materials for virgin materials will preserve natural resources. The emission of greenhouse gases is reduced and energy is saved because there is a reduction in the use of energy intensive processes required to process virgin materials. Costs for disposal will decrease since the industrial materials will not be disposed of at landfills. This can save money for material generators and end users.

EPA Region 8 includes the states of Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming, as well as 27 tribal nations. The Region is made up of a diverse set of landscapes, population bases, and economic sectors. The challenges that impact the feasibility for increasing IMR in Region 8 are large land availability, low tipping fees, and market factors (i.e. distance, local availability, and changing markets). There are multiple facets to address to enable the successful recycling and reuse of industrial materials. These include, but are not limited to, environmental and human health protection, materials processing, market availability, and meeting performance requirements in end use applications.

Project Description

EPA Region 8 has completed this project to assemble relevant performance standard specifications and guidance for various industrial materials. Standard specifications provide direction, provisions, and requirements pertaining to performance of construction work. State departments of environmental quality can refer beneficial use applicants to this information, as well as use it to understand the scope of allowable industrial materials recycling in transportation applications in their respective states. State environmental agencies that work with their departments of transportation (DOT) on increasing the use of industrial materials in roadway applications can find this information helpful.

The standard specifications and guidelines are provided in tables according to the standard setting organization. This information was researched from national standard development organizations like ASTM International (formerly the American Society for Testing and Materials), the American Association of State Highway and Transportation Officials (AASHTO), as well as EPA Region 8 DOT standard specifications, standard specifications and guidelines from the Federal Highway Administration (FHWA), and specifications from the American Concrete Institute (ACI).

The standard specifications and guidelines can be used as references for the types of industrial materials that are allowed to be reused and recycled in various construction projects or applications in each state. The tables provide a brief description of each standard specification, what recycled material(s) the specification applies to, and how and for what application(s) the recycled materials can be used in. This information can streamline searches for state DOT standard specifications that allow the use of industrial materials in transportation construction, saving one from reading through entire state manuals.

Methodology

The states reviewed were the EPA Region 8 states that include Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming. The standard specifications and guidelines that allow for the reuse and recycling of industrial materials in the Region 8 states were determined from multiple sources. The primary sources of these standard specifications and guidelines are those from departments of transportation (DOT) within Region 8, as well as national standard setting organizations.

References for the standard specifications and guidelines are provided for each table.

National Standard Specifications and Guidelines

The primary sources of the national standard specifications and guidelines are from ASTM International, AASHTO, ACI, and FHWA. The following steps were taken to collect and organize this information for this project.

- Multiple publications like handbooks, fact sheets, and reports were reviewed. These resources were published by the U.S. Environmental Protection Agency (EPA), American Concrete Institute (ACI), ASTM International, American Association of State and Highway Transportation Officials (AASHTO), U.S. Department of Transportation Federal Highway Administration (FHWA), American Coal Ash Association (ACAA), and the National Council for Air and Stream Improvement (NCASI). These publications included "Fly Ash Facts for Highway Engineers," "Beneficial Use of Industrial By-Products," "Foundry Sand Facts for Civil Engineers," and "Using Coal Ash in Highway Construction: A Guide to Benefits and Impacts." The resources contain standard specifications that have been and can be used in a variety of projects that reuse and recycle industrial materials.

- Reliable agency and organizational websites were also examined. Some of these websites included EPA's 2008 Beneficial Use of Industrial Materials Summit, http://www.beneficialusesummit.com, and the Recycled Materials Resource Center (RMRC), http://www.recycledmaterials.org.

- The standard specifications and guidelines were researched for additional detail at ASTM International (http://www.astm.org), AASHTO (http://www.transportation.org), ACI (http://www.concrete.org), and FHWA (http://www.fhwa.dot.gov/) websites to gather as much information about the specifications as possible.

- ASTM reference sheets and ACI reference books were obtained from the EPA Region 8 Technical Library through interlibrary loans. These references were reviewed and helped provide additional information that was not available on websites.

- Reference books obtained from the Arthur Lakes Library at the Colorado School of Mines were used to research AASHTO standards.

- FHWA guidelines were found from the sources provided by the Federal Highway Administration (FHWA), American Coal Ash Association (ACAA), and the 2008 Beneficial Use of Industrial Materials Summit website, http://www.beneficialusesummit.com/midwest/summit/rmt_rpt.pdf.

- Researching these websites and publications enabled development of a list of standard specifications and guidelines that were put into tables and separated by ASTM International, AASHTO, ACI, and FHWA. The tables contain the titles of the standard specifications and guidelines, brief descriptions, the recycled materials that can be used, the applications (end uses) the standards apply to, and references to resources supporting this information.

The Recycled Materials Resource Center (RMRC), http://www.recycledmaterials.org, has created a matrix as a part of the "User Guidelines for Byproducts and Secondary Use Materials in Pavement Construction" that shows material-application combinations, i.e. what materials can be used in which specific applications. The matrix is located at http://www.recycledmaterials.org/tools/uguidelines/index.asp#matrix.

EPA Region 8 Department of Transportation (DOT) Standard Specifications

The primary source of information for the EPA Region 8 state DOT standard specifications was the FHWA Specifications Library. The following steps were taken to collect and organize this information for this project.

- State DOT standard specifications and supplemental specifications, including some "Standard Specifications for Road and Bridge Construction" manuals, were reviewed from the Federal Highway Administration (FHWA)'s Specification Library website, http://fhwapap04.fhwa.dot.gov/nhswp/browseStandardSpecs.jsp. This site provides online references to standard specifications for every U.S. state. These manuals can also be retrieved from individual state DOT web pages.

- Each section of the manuals was reviewed to find standard specifications which allow for the reuse and recycling of industrial materials. Some states have supplemental specifications. These provide additional information to add, remove, or edit existing standard specification information. Supplemental specifications provide the most current information and update state standard specifications.

- FHWA standard specifications were obtained online from "Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects," and provided in a separate table.

- Individual tables containing current state DOT standard specifications were constructed for each state. Each table contains the section title and section name from the respective state's manual, the description for the standard specification, the material(s) being recycled, the application(s) (end uses) for which the material(s) can be used, and references to resources supporting this information.

These tables are posted on the EPA Region 8's website at http://www.epa.gov/region8/recycling/im.html.

Disclaimer

Although the best efforts were made to collect information about the beneficial use of industrial materials in transportation applications, the tables provided for this project may not include all standard specifications and guidelines that allow the reuse and recycling of industrial materials. Specifications for individual industrial materials testing procedures

(e.g. density, temperature, etc.) were not included in this project unless publications by EPA, other agencies, and organizations reviewed for this project contained a reference to them. Instead, this project focuses on the allowable and direct use of industrial materials in specific applications.

The reuse and/or recycling of fly or bottom ash, gypsum, slags, foundry sands, silica fume, baghouse fines, glass, tires, asphalt, concrete, and wood were the primary focuses for this project. Other materials included recycling agents, pozzolans, and other bituminous material. Specifications that allow for reuse of construction-related materials or excavations, or a potential for reuse (salvaging, collection, processing, and/or stockpiling) of these materials, were also included. If the reviewed specifications indicated that "other approved materials" could be used, these were included and stated as such in the case that the use of industrial materials may be considered within this definition.

It is important to note that all additional requirements within a specification may not be captured in the tables, and therefore users should consult actual specification manuals for all necessary requirements that apply to a given situation. Standard specifications that state that the user should follow requirements for another [standard specification] that allows for the use of industrial materials were included in this project. The referenced specification was included under "other requirements" in the tables.

Only sections of state DOT manuals that allow for the reuse and recycling of industrial materials in various applications, and not their disposal, are included. Any type of reuse or recycling of soils, and Basis of Payment or Method of Measurement sections were excluded. The FHWA standard specifications are issued primarily for constructing roads and bridges on Federal Highway projects under the direct administration of the Federal Highway Administration.

Please note that standard specifications and guidelines are revised, updated, and/or renewed every few years. Therefore, the information contained in the tables is current as of August 2009, but may not remain so in entirety at a later date. It is recommended that the direct sources for these standards be reviewed to ensure the most current information is obtained.

Table 1. ASTM International Standard Specifications

ASTM International - Standard Specification/Guideline	Description	Source	Recycled Material	Application
C29 / C29M - 07 Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate	Determines bulk density values that are used to select proportions for concrete mixtures	Footnotes 1, 6, 8, 9, 10, 25	Foundry Sands	Asphalt Concrete Pavement, Stabilized Base
C33 / C33M - 08 Standard Specification for Concrete Aggregates	Defines the requirements for grading and quality of fine and coarse aggregate used in concrete	Footnotes 1, 6, 8, 9, 10, 13, 15, 25, 27	Foundry Sand, Blast Furnace Slag, Crushed Hydraulic-Cement Concrete	Portland Cement Concrete Pavement, Course Aggregate, Fine Aggregate
C39 / C39M Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens	Results are used as a basis for quality control of concrete proportioning, mixing, and placing operations. Results also used for determination of compliance with specifications, control for evaluating effectiveness of admixtures, and similar uses.	Footnotes 1, 6, 8, 9, 13, 16, 18, 26, 27	Foundry Sands	Portland Cement Concrete Pavement, Flowable Fill
C78 - 08 Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)	Results may be used to determine compliance with specifications or as a basis for proportioning, mixing and placement operations	Footnotes 1, 6, 8		Portland Cement Concrete Pavement
C88 - 05 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Provides a procedure for making a preliminary estimate of the soundness of aggregates for use in concrete and other purposes	Footnotes 1, 8, 9	Blast Furnace Slag, Foundry Sand, Steel Slag	Asphalt Concrete Pavement, Stabilized Base, Flowable Fill
C94 / C94M - 09 Standard Specification for Ready-Mixed Concrete	Covers ready-mixed concrete manufactured and delivered to a purchaser in freshly mixed and unhardened state	Footnotes 1, 6, 8, 11, 12, 13, 15, 26, 27	Fly Ash, Natural Pozzolans, Blast Furnace Slag	Portland Cement Concrete Pavement

ASTM International - Standard Specification/Guideline	Description	Source	Recycled Material	Application
C109 / C109M - 08 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)	Determines the compressive strength of hydraulic cement and other mortars. Results used to determine compliance with specifications.	Footnotes 1, 6, 8, 11, 13	Ground Granulated Blast Furnace Slag	Stabilized Base, Flowable Fill
C131 - 06 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine	The Los Angeles testing machine tests the sizes of coarse aggregate smaller than 37.5 mm (1½ in.) for resistance to degradation	Footnotes 1, 8, 9	Stabilized Base, Blast Furnace Slag, Steel Slag, Foundry Sand	Asphalt Concrete Pavement, Portland Cement Concrete Pavement, Granular Base, Flowable Fill
C138 / C138M - 08 Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete	Determines the density of freshly mixed concrete and gives formulas for calculating the unit weight, yield or relative yield, cement content, and air content of the concrete	Footnotes 1, 8, 9, 10, 27	Foundry Sands	Portland Cement Concrete Pavement, Flowable fill
C144 - 04 Standard Specification for Aggregate for Masonry Mortar	Use of aggregate in masonry mortar	Footnotes 1, 9	Foundry Sands, Blast Furnace Slag	Grout and Mortar
C150 - 07 Standard Specification for Portland Cement	Specification covers eight types of Portland cement: Type I, Type IA, Type II, Type IIA, Type III, Type IIIA, Type IV, and Type V	Footnotes 1, 6, 8, 9, 10, 13, 15, 17, 25	Foundry Sands	Portland Cement Concrete Pavement, Stabilized Base, Flowable Fill
C232 - 07 Standard Test Methods for Bleeding of Concrete	Determines the relative quantity of mixing water that will bleed from a sample of freshly mixed concrete	Footnotes 1, 8, 9	Foundry Sands	Portland Cement Concrete Pavement, Flowable Fill
C311 - 07 Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete	Develops data for comparison with the requirements of Specification C 618	Footnotes 1, 5, 8, 12, 13, 14	Fly Ash, Pozzolans	Mineral Admixture in Portland Cement Concrete, Stabilized Base, Flowable Fill

ASTM International - Standard Specification/Guideline	Description	Source	Recycled Material	Application
C330 - 05 Standard Specification for Lightweight Aggregates for Structural Concrete	Covers lightweight aggregate used in structural concrete. Focuses on reducing the density and maintaining the concrete's compressive strength.	Footnotes 1, 9, 27	Foundry Sands, Fly Ash, Blast Furnace Slag,	Structural Concrete
C403 / C403M - 08 Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance	Determines of the time of setting of concrete, with slump greater than zero, by means of penetration resistance measurements on mortar sieved from the concrete mixture	Footnotes 1, 6, 8, 9, 15	Foundry Sands	Portland Cement Concrete Pavement, Flowable fill, Mortar, Grout
C441 - 05 Standard Test Method for Effectiveness of Pozzolans or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to the Alkali-Silica Reaction	Covers the determination of the effectiveness of pozzolans or slag in preventing the excessive expansion caused by reaction between aggregates and alkalies in Portland cement mixtures	Footnotes 1, 27	Ground Blast Furnace Slag, Pozzolans, Glass Aggregate	Mortar, Portland Cement Concrete Pavement
C494 / C494M - 08a Standard Specification for Chemical Admixtures for Concrete	Covers materials and the test methods for use in chemical admixtures to be added to hydraulic-cement concrete mixtures in the field	Footnotes 1, 6, 8, 10, 13, 17, 18, 25, 27	Pozzolans, Hydraulic Cement	Portland Cement Concrete Pavement
C593 - 06 Standard Specification for Fly Ash and Other Pozzolans for Use With Lime for Soil Stabilization	Qualification of fly ash and other pozzolans for use with lime in plastic, nonplastic mixtures and other mixtures that affect lime pozzolanic reaction required by soil stabilization.	Footnotes 1, 6, 8, 12	Fly Ash, Bottom Ash, Boiler Slag, Pozzolans,	Stabilized Base, Cement
C595 - 08 Standard Specification for Blended Hydraulic Cements	Blended hydraulic cements for general and special applications using slag or pozzolans, or both, with Portland cement, Portland cement clinker, or slag with lime	Footnotes 1, 5, 10, 11, 12, 13, 14, 15, 17, 27	Fly Ash, Blast Furnace Slag, Pozzolans	Flowable Fill, Portland Blast Furnace Slag Cement, Blended Cement, Concrete

ASTM International - Standard Specification/Guideline	Description	Source	Recycled Material	Application
C596 - 07 Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement	Determines the change in length on drying of mortar bars containing hydraulic cement and graded standard sand	Footnotes 1, 6		Mortar, Hydraulic Cement
C618 - 08a Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolans for Use in Concrete	Covers coal fly ash and raw or calcined natural pozzolans used in concrete where cementitious and/or pozzolanic action is desired, or where other properties normally attributed to fly ash and/or pozzolans may be desired	Footnotes 1, 5, 6, 7, 8, 10, 12, 13, 14, 15. 17, 24, 25, 27	Fly Ash, Raw or Calcined Natural Pozzolans	Admixture in Portland Cement Concrete, Portland Cement Concrete Pavement, Stabilized Base, Flowable Fill
C666 / C666M - 03(2008) Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing	Determines the effects of variations in both properties and conditioning of concrete in the resistance to freezing and thawing cycles	Footnotes 1, 6, 8, 11, 16, 17	Blast Furnace Slag	Portland Cement Concrete Pavement
C672 / C672M - 03 Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals	Evaluates the effect of mixture proportioning, surface treatment, curing, or other variables on resistance to scaling	Footnotes 1, 6, 16		Concrete
C685 / C685M - 07 Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing	Covers concrete made from materials continuously batched by volume, mixed in a continuous mixer, and delivered to the purchaser in a freshly mixed and unhardened state	Footnotes 1, 6, 8, 27	Blast Furnace Slag	Portland Cement Concrete Pavement
C827 - 01 Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures	Provides a means for comparing the relative shrinkage or expansion of cementitious mixtures	Footnotes 1, 8, 9	Foundry Sands	Flowable fill, Grout
C917 - 05 Standard Test Method for Evaluation of Cement Strength Uniformity From a Single Source	Intended for use when the purchaser desires information on the strength uniformity of a hydraulic cement	Footnotes 1, 6, 13		Hydraulic Cement

ASTM International - Standard Specification/Guideline	Description	Source	Recycled Material	Application
	produced at a single source			
C928 / C928M - 08 Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs	Covers packaged, dry, cementitious mortar or concrete materials for rapid repairs to hardened hydraulic-cement concrete pavements and structures	Footnotes 1, 6, 27		Cementitious Mortar, Concrete Materials, Hydraulic-Cement Concrete
C939 - 02 Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)	Test method is applicable to the determination of the fluidity of various fluid grout mixtures	Footnotes 1, 6, 8, 15, 27	Concrete Aggregate	Flowable Fill, Hydraulic-Cement Grout
C989 - 09 Standard Specification for Slag Cement for Use in Concrete and Mortars	Covers three strength grades of slag cement for use as a cementitious material in concrete and mortar	Footnotes 1, 10, 11, 13, 17, 25, 27	Ground Granulated Blast Furnace Slag	Concrete, Mortar, Grout
C1012 - 04 Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution	Assessing the sulfate resistance of mortars made using Portland cement, blends of Portland cement with pozzolans or slags, and blended hydraulic cements	Footnotes 1, 27	Pozzolans, Blended Hydraulic Cement, Slag, Fly Ash	Mortars
C1157 - 08 Standard Performance Specification for Hydraulic Cement	Specification covers hydraulic cements for both general and special applications	Footnotes 1, 6, 9, 12, 14, 27	Foundry Sands, Fly Ash, Blast Furnace Slag	Portland Cement Concrete Pavement, Blended Cement
C1240 - 05 Standard Specification for Silica Fume Used in Cementitious Mixtures	Specification covers silica fume for use in concrete and other systems containing hydraulic cement	Footnotes 1, 8, 25, 27	Silica Fume	Portland Cement Concrete Pavement
C1567 - 08 Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)	Provides a means for evaluating the ability of pozzolans and ground granulated blast-furnace slag to control deleterious internal expansion due to alkali-silica reaction when used with an aggregate intended for use in concrete	Footnote 1	Blast Furnace Slag, Pozzolans, Fly Ash	Concrete

ASTM International - Standard Specification/Guideline	Description	Source	Recycled Material	Application
C1602 / C1602M - 06 Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete	Specification covers mixing water used in the production of hydraulic cement concrete	Footnotes 1, 27		Hydraulic Cement Concrete
D242 - 04 Standard Specification for Mineral Filler For Bituminous Paving Mixtures	Specification covers mineral filler added as a separate ingredient for use in bituminous paving mixtures	Footnotes 1, 8	Fly Ash, Slag Dust, Hydraulic Cement	Bituminous Paving Mixtures, Mineral Filler
D692 - 00(2004) Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures	Specification covers coarse aggregates suitable for use in bituminous paving mixture	Footnotes 1, 8	Reclaimed Concrete, Blast Furnace Slag, Hydraulic-Cement Concrete	Asphalt Concrete Pavement, Bituminous Paving Mixtures
D698 - 07 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort	Laboratory compaction methods used to determine the relationship between molding water content and dry unit weight of soils (compaction curve) compacted in a 4 or 6-in.	Footnotes 1, 6, 8, 9	Foundry Sand	Embankments or Fills, Stabilized Base, Flowable Fill, Foundation Pads, Road Bases
D1883 - 07 Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils	Evaluate the potential strength of subgrade, subbase, and base course material, including recycled materials in road and airfield pavements	Footnotes 1, 6, 8	Foundry Sand, Waste Glass	Granular Base, Embankments or Fills, Flowable Fill
D2166 - 06 Standard Test Method for Unconfined Compressive Strength of Cohesive Soil	Determines the unconfined compressive strength of cohesive soil in the intact, remolded, or reconstituted condition, using strain-controlled application of the axial load	Footnotes 1, 8, 9	Foundry Sand	Flowable Fill
D2419 - 02 Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate	Test method is intended to serve as a rapid field correlation test	Footnotes 1, 8, 9	Foundry Sands	Asphalt Concrete Pavement, Granular Base, Stabilized Base

ASTM International - Standard Specification/Guideline	Description	Source	Recycled Material	Application
D4219 - 08 Standard Test Method for Unconfined Compressive Strength Index of Chemical-Grouted Soils	Test method obtains values for comparison with other test values to verify uniformity of materials or the effects of controllable variables, in grout-soil compositions	Footnotes 1, 8, 9	Foundry Sands	Flowable Fill
D4318 - 05 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils	Test methods cover the determination of the liquid limit, plastic limit, and the plasticity index of soils	Footnotes 1, 6, 8	Foundry Sand	Granular Base
D4829 - 08 Standard Test Method for Expansion Index of Soils	Expansion Index, EI, provides an indication of swelling potential of a compacted soil	Footnotes 1, 6	Fly Ash	Soil-Fly Ash Blends
D4832 - 02 Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders	Test method is used to prepare and test cylindrical specimens of CLSM to determine the compressive strength of the hardened material	Footnotes 1, 9, 15	Foundry Sands, Fly Ash, Cement	Flowable Fill, Backfill
D5239 - 04 Standard Practice for Characterizing Fly Ash for Use in Soil Stabilization	Intended for use with fly ash that can be used separately or along with other stabilizing admixtures to improve soil properties	Footnotes 1, 5, 6, 8	Fly Ash	Waste Solidification, Soil Stabilization
D5759 - 95(2005) Standard Guide for Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses	Provides guidance for the characterization of coal fly ash or clean coal combustion fly ash for potential uses in which absorption, cementitious activity, pozzolanic activity, pH adjustment, heat rise, or stabilization and solidification properties may be desired	Footnotes 1, 5	Fly Ash, FGD Material	Waste Solidification, Soil Stabilization
D5971 - 07 Standard Practice for Sampling Freshly Mixed Controlled Low-Strength Material	Procedure to obtain a representative sample of freshly mixed controlled low-strength material (CLSM) to	Footnotes 1, 9, 15	Foundry Sands, Fly Ash	Flowable Fill, Structural Fill, Mortar

ASTM International - Standard Specification/Guideline	Description	Source	Recycled Material	Application
	perform tests to determine compliance with quality requirements of the specifications			
D6023 - 07 Standard Test Method for Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low-Strength Material (CLSM)	Test method explains determination of the density of freshly mixed Controlled Low-Strength Material (CLSM)	Footnotes 1, 9	Foundry Sands, Fly Ash	Flowable Fill, Controlled Density Fill, Soil-Cement Slurry, Soil-Cement Grout, Unshrinkable Fill
D6024 - 07 Standard Test Method for Ball Drop on Controlled Low Strength Material (CLSM) to Determine Suitability for Load Application	Explains the determination of the ability of Controlled Low Strength Material (CLSM) to withstand loading by repeatedly dropping a metal weight onto the in-place material	Footnotes 1, 9	Foundry Sands, Fly Ash	Flowable Fill, Controlled Density Fill, Soil-Cement Slurry, Soil-Cement Grout, Unshrinkable Fill, Mortar, Backfill, Soil Stabilization
D6103 - 04 Standard Test Method for Flow Consistency of Controlled Low Strength Material (CLSM)	Provides a procedure to determine the fluidity of CLSM mixtures	Footnotes 1, 9, 15	Foundry Sands, Fly Ash	Flowable Fill, Backfill, Structural Fill, Controlled Density Fill, Soil-Cement Slurry, Soil-Cement Grout, Unshrinkable Fill, Mortar
D6155 - 06 Standard Specification for Nontraditional Coarse Aggregates for Bituminous Paving Mixtures	Covers the use of coarse aggregates not traditionally used in bituminous paving mixtures	Footnotes 1, 8	Reclaimed Concrete, Crushed Hydraulic-Cement Concrete, Crushed Blast-Furnace Slag, Steel Furnace Slag, Recycled Aggregate	Coarse Aggregates in Bituminous Paving Mixtures

ASTM International - Standard Specification/Guideline	Description	Source	Recycled Material	Application
D6270 - 08 Standard Practice for Use of Scrap Tires in Civil Engineering Applications	Provides guidance for testing the physical properties, design considerations, construction practices, and leachate generation potential of processed or whole scrap tires in place of conventional civil engineering materials	Footnotes 1, 7	Blast Furnace Slag, Recycled Concrete, Scrap Tires, Recycled Lightweight Aggregate	Embankment Fill, Backfill, Drainage Layers, Landfills, Thermal Insulation, Vibration Damping Layers and Replacement for Soil or Rock. Use of Scrap Tires includes Retaining Walls, Drainage Culverts, Road-Base Reinforcement, Erosion Protection, and Fills
D6523 - 00(2005) Standard Guide for Evaluation and Selection of Alternative Daily Covers (ADCs) for Sanitary Landfills	Assessing the different options available for sanitary landfill daily cover materials described as alternative (non-soil) daily covers (ADCs)	Footnotes 1, 5	Foundry Sands, Sludge, Ash, Tires, Green Waste, Construction & Demolition Debris, Automobile Recycling	Alternative Daily Landfill Cover
E1266 - 88(2005) Standard Practice for Processing Mixtures of Lime, Fly Ash, and Heavy Metal Wastes in Structural Fills and Other Construction Applications	Provides descriptions and references of existing test methods and commercial practices relating to the processing of lime, fly ash, and heavy metal wastes in construction applications	Footnotes 1, 5	Fly Ash, Heavy Metal Wastes	Structural Fill, Treating Hazardous/Non Hazardous Wastes, Liners, Foundations, Road Base, Backfills, Embankments, Earth Dams, Waste Stabilization/Solidification
E1861-97 Standard Guide for Use of Coal Combustion By-Products in Structural Fills	Procedures for the design and construction of engineered structural fills using coal combustion by-products (CCBs)	Footnotes 1, 5, 6	FGD Material, Bottom Ash, Boiler Slag, Fly Ash	Structural Fill

ASTM International - Standard Specification/Guideline	Description	Source	Recycled Material	Application
E2060 - 06 Standard Guide for Use of Coal Combustion Products for Solidification/Stabilization of Inorganic Wastes	Methods for selection and application of coal combustion products (CCPs) for use in the chemical stabilization of trace elements in wastes and wastewater	Footnotes 1, 5	FGD Material, Bottom Ash, Boiler Slag, Fly Ash, Spent Dry Scrubber Sorbents, Cement Kiln Dust, Cement	Soil Stabilization, Waste Solidification
E2243 - 02 Standard Guide for Use of Coal Combustion Products (CCPs) for Surface Mine Reclamation: Re-Contouring and Highwall Reclamation	Provides guidance on identification of coal combustion products (CCPs) with appropriate engineering and environmental performances	Footnotes 1, 5	FGD Material, Bottom Ash, Boiler Slag, Fly Ash	Mine Reclamation, Highwall Reclamation, Other Fills or Soil Replacement, Structural Fill, Road Construction, Soil Modification, Isolation of Acid Forming Materials, Reduction of Acid Mine Drainage, Highwall Mining
E2277 - 03 Standard Guide for Design and Construction of Coal Ash Structural Fills	Procedures for the design and construction of engineered structural fills	Footnotes 1, 7, 8, 24	Fly Ash, Bottom Ash, Ponded Ash, Boiler Slag, FGD Material, Foundry Sands, Reclaimed Crushed Concrete	Structural Fill, Embankment

Table 2. American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications

AASHTO - Standard Specification/Guideline	Description	Source	Recycled Material	Application
M 6: Standard Specification for Fine Aggregate for Portland Cement Concrete	Covers the quality and grading of fine aggregate for Portland cement concrete used in pavements or bases, highway bridges and incidental structures	Footnote 19		Aggregate for Portland Cement Concrete
M 17-95: Standard Specification for Mineral Filler For Bituminous Paving Mixtures	Covers mineral filler added as a separate ingredient for use in bituminous paving mixtures	Footnote 19	Slag Dust, Hydraulic Cement, Fly Ash	Bituminous Paving Mixtures
M 29-03: Standard Specification for Fine Aggregate for Bituminous Paving Mixtures	Covers fine aggregate for use in bituminous paving mixtures	Footnote 19	Crushed Blast-Furnace Slag	Aggregate for Bituminous Paving Mixtures
M 45-06: Standard Specification for Aggregate for Masonry Mortar	Covers aggregate for use in masonry mortar	Footnote 19	Crushed Stone, Iron Blast-Furnace Slag	Masonry Mortar
M 80-87: Standard Specification for Coarse Aggregate for Portland Cement Concrete	Covers coarse aggregate, other than lightweight aggregate, for use in concrete	Footnote 19	Crushed Concrete, Blast-Furnace Slag	Aggregate for Portland Cement Concrete
M 85-06: Specification for Portland Cements	Covers eight types of Portland cement	Footnotes 6, 19	Fly Ash	Portland Cement Concrete
M 147-65: Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses	Covers quality and grading of sand-clay mixtures; gravel, stone or slag screenings; or sand, crusher run coarse aggregate consisting of gravel, crushed stone, or slag with or without soil mortar or any combination of the materials for use in construction of subbase, base and surface courses	Footnote 19	Slag, Crushed Stone	Aggregate and Soil-Aggregate
M 154-06: Standard Specifications for Air-Entraining Admixtures for Concrete	Covers materials proposed for use in air-entraining admixtures to be added to concrete mixtures in the field	Footnote 19		Concrete

AASHTO - Standard Specification/Guideline	Description	Source	Recycled Material	Application
M 157-06: Standard Specification for Ready-Mixed Concrete	Covers ready-mixed concrete manufactured and delivered to purchaser in freshly mixed and unhardened state as specified	Footnote 19	Fly Ash, Ground Granulated Blast-Furnace Slag, Silica Fume	Ready-Mixed Concrete
M 176-06: Standard Specification for Porous Concrete Pipe	Covers porous non reinforced concrete pipe for use in underdrains	Footnote 19	Cement with Blast Furnace Slag Cement, Portland-Pozzolan Cement, Fly Ash	Cement and Concrete Pipe
M 194-06: Standard Specification for Chemical Admixtures for Concrete	Covers materials for use as chemical admixtures to be added to hydraulic-cement concrete mix in the field	Footnote 19	Cement, Pozzolan, Aggregate, Hydraulic Cement	Concrete
M 195-06: Standard Specification for Lightweight Aggregate for Structural Concrete	Covers lightweight aggregate for use in structural concrete in which the prime considerations are reducing the density while maintaining compressive strength of concrete	Footnote 19	Blast-Furnace Slag, Fly Ash	Structural Concrete
M 199-05: Standard Specification for Precast Reinforced Concrete Manhole Sections	Covers the manufacture and purchase requirements of products for the assembly and construction of circular precase reinforced concrete manholes used in sewers and waterworks	Footnote 19	Cement Can Contain Fly Ash, Portland Blast-Furnace Slag Cement, and Portland-Pozzolan Cement	Concrete
M 206-06: Standard Specification for Reinforced Concrete Arch Culvert, Stormdrain and Sewer Pipe	Covers reinforced arch-shaped concrete pipe to be used for the conveyance of sewage, industrial wastes, storm water and for the construction of culverts	Footnote 19	Fly Ash, Ground Granulated Blast-Furnace Slag. Cement can contain Portland Blast Furnace Slag Cement, Slag	Concrete

AASHTO - Standard Specification/Guideline	Description	Source	Recycled Material	Application
			Modified Portland Cement, Portland-Pozzolan Cement and Fly Ash	
M 207-06: Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe	Covers reinforced elliptically shaped concrete pipe to be used for conveyance of sewage, industrial wastes, storm water and for the construction of culverts	Footnote 19	Fly Ash, Ground Granulated Blast-Furnace Slag. Cement can contain Portland Blast Furnace Slag Cement, Slag Modified Portland Cement, Portland-Pozzolan Cement and Fly Ash	Concrete
M 240-05: Specifications for Hydraulic Blended Cements	Pertains to 5 classes of blended hydraulic cement for general and special applications using slag and/or pozzolan with Portland cement, Portland cement clinker or slag with lime	Footnotes 6, 7, 19	Fly Ash, Portland Blast-Furnace Slag Cement, Portland-Pozzolan Cement, Slag Modified Portland Cement, Slag Cement	Cement and Concrete, Retaining Walls
M 241-06: Standard Specification for Concrete made by Volumetric Batching and Continuous Mixing	Covers concrete made from materials continuously batched by volume, mixed in a continuous mixer, and delivered to purchaser in freshly mixed and unhardened state	Footnote 19	Fly Ash in Mineral Admixtures, Ground Granulated Blast-Furnace Slag	Concrete

AASHTO - Standard Specification/Guideline	Description	Source	Recycled Material	Application
M 242-06: Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe	Covers reinforced concrete pipe designed for specific D-loads and intended to be used for conveyance of sewage, industrial wastes, storm water and for the construction of culverts	Footnote 19	Fly Ash, Ground Granulated Blast-Furnace Slag, Slag Modified Portland Cement. Cement contains Portland Blast-Furnace Slag Cement, Portland-Pozzolan Cement, and/or Fly Ash.	Concrete
M 259-98: Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains and Sewer Pipes	Covers single-cell precast reinforced concrete box sections intended to be used for construction of culverts and conveyance of storm water, industrial wastes, and sewage	Footnote 19	Fly Ash, Ground Granulated Blast-Furnace Slag. Cement contains Portland Blast-Furnace Slag Cement, Portland-Pozzolan Cement, and/or Fly Ash.	Concrete
M 273-00: Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains and Sewers With Less Than 2 ft of Cover Subjected to Highway Loadings	Covers single-cell precast reinforced concrete box sections with less than 2 ft of cover subjected to highway loadings and used for construction of culverts and conveyance of storm water, industrial wastes, and sewage	Footnote 20	Fly Ash, Ground Granulated Blast-Furnace Slag. Cement contains Portland Blast-Furnace Slag Cement, Portland-Pozzolan Cement, and/or Fly Ash.	Concrete

AASHTO - Standard Specification/Guideline	Description	Source	Recycled Material	Application
M 295-06: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolans for use as Mineral Admixture in Concrete	Covers coal fly ash and raw or calcined natural pozzolan for concrete where cementitous and/or pozzolanic action is desired, or where other properties normally attributed to finely divided coal fly ash and raw or calcined natural pozzolan is desired or where both objects are achieved	Footnotes 6, 20, 24	Fly Ash, Natural or Calcined Pozzolan	Mineral Admixture in Concrete
M 302-06: Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars	Covers three strength grades of finely ground granulated blast-furnace slag for use as a cementitous material in concrete and mortar	Footnotes 20, 25	Ground Granulated Blast-Furnace Slag	Concrete, Mortar
M 307-05: Standard Specification for Silica Fume Used in Cementitious Mixtures	Covers silica fume for use in concrete and other systems containing hydraulic cement	Footnote 20	Silica Fume	Cementitious Mixtures
M 318-02: Standard Specification for Glass Cullet Use for Soil-Aggregate Base Course	Covers processed glass cullet intended for use as a granular road base material	Footnote 20	Waste Glass, Crushed Aggregate	Granular Road Base Material
M 319-02: Standard Specification for Reclaimed Concrete Aggregate for Unbound Soil-Aggregate Base Course	Covers use of reclaimed concrete aggregate as an unbound granular base course material	Footnote 20	Slag, Crushed Concrete, Reclaimed Concrete Aggregate	Granular Road Base Material
MP 15-06: Standard Specification for Use of Reclaimed Asphalt Shingle as an Additive in Hot-Mix Asphalt	Covers reclaimed asphalt shingle materials used as an additive in hot mix asphalt	Footnote 23	Reclaimed Asphalt Shingles	Hot Mix Asphalt
PP 53-06: Design Considerations When Using Reclaimed Asphalt Shingles in New Hot-Mix Asphalt	Recommended practice provides guidance for designing hot mix asphalt incorporating reclaimed asphalt shingles	Footnote 23	Reclaimed Asphalt Shingles	Hot Mix Asphalt

AASHTO - Standard Specification/Guideline	Description	Source	Recycled Material	Application
PP 56-06: Recommended Practice for Evaluating the Engineering and Environmental Suitability of Recycled Materials	Recommended practice provides general evaluation framework for assessing the feasibility to use recycled materials in the highway environment	Footnote 23		
T 21-05: Standard Method of Test for Organic Impurities in Fine Aggregates for Concrete	Covers two procedures for an approximate determination of the presence of injurious organic compounds in fine aggregates that are to be used in hydraulic cement mortar or concrete	Footnote 21		Concrete, Mortar
T 26-79: Standard Method of Test for Quality of Water to be Used in Concrete	Determination of the acidity or alkalinity in water to be used in concrete	Footnotes 6, 21	Fly Ash	Concrete
T 37-06: Standard Method of Test for Sieve Analysis of Mineral Filler for Hot-Mix Asphalt	Covers the sieve analysis of mineral fillers used in hot mix asphalt	Footnote 21		Mineral Filler for Hot Mix Asphalt
T 71-03: Standard Method of Test for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar	Covers the determination of the effect on mortar strength of the organic impurities in fine aggregate, whose presence is indicated by tests with T 21	Footnote 21		Fine Aggregate
T 96-02: Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine	Covers a procedure for testing sizes of coarse aggregate smaller than 37.5 mm (1½ in.) for resistance to degration using the Los Angeles testing machine	Footnote 21		Aggregate
T 103-91: Standard Method of Test for Soundness of Aggregates by Freezing and Thawing	Method describes three procedures to be followed in testing aggregates to determine their resistance to disintegration by freezing and thawing	Footnote 21		Aggregate

AASHTO - Standard Specification/Guideline	Description	Source	Recycled Material	Application
T 104-99: Standard Method of Test for Soundess of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate	Covers the procedure to be followed in testing aggregates to determine their resistance to disintegration by saturated solutions of sodium sulfate or magnesium sulfate	Footnote 21		Aggregate
T 106-04: Standard method of test for compressive strength of hydraulic cement mortar (using a 50 mm or 2-in) cube specimen	Test method provides a means of determining the compressive strength of hydraulic cement and other mortars and results may be used to determine compliance with specifications	Footnotes 6, 21	Fly Ash	Hydraulic Cement, Grout, Mortars
T 176-02: Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test	Test is intended to serve as a rapid test to show the relative proportions of fine dust or claylike material in soils or graded aggregates	Footnote 21		Aggregate
T 195-67 (2005): Standard Method of Test for Determining Degree of Particle Coating of Bituminous-Aggregate Mixtures	Method covers determination of the degree of particle coating in a bituminous-aggregate mix, on the basis of the percentage of coarse aggregate particles that are completely coated	Footnote 21		Bituminous-Aggregate Mixtures
T 196-05: Standard Specification for Air Content of Freshly Mixed Concrete by the Volumetric Method	Test method covers determination of the air content of freshly mixed concrete containing any type of aggregate, whether it is dense, cellular or lightweight	Footnote 21		Aggregate, Concrete
T 197-05: Standard Method of Test for Time of Settling of Concrete Mixtures by Penetration Resistance	Test method covers determination of the setting time of concrete, with slump greater than zero, by means of penetration resistance measurements on mortar sieved from the concrete mixture	Footnotes 6, 21	Fly Ash	Concrete

AASHTO - Standard Specification/Guideline	Description	Source	Recycled Material	Application
T 232: Standard Method of Test for Cement Content of Freshly Mixed Soil-Cement	Determines actual lime content from samples using approved titration methods	Footnote 6	Fly Ash	Cement
T 319-03: Standard Method of Test for Quantitative Extraction and Recovery of Asphalt Binder From Asphalt Mixtures	Procedure for extracting and recovering asphalt binder from asphalt mixtures (Hot Mix Asphalt and Reclaimed Asphalt Pavement) that have minimal effect on physical and chemical properties of the asphalt binder recovered	Footnote 22	Reclaimed Asphalt Pavement	

Table 3. American Concrete Institute (ACI) Standard Specifications

ACI - Standard Specification/Guideline	Description	Source	Recycled Material	Application
211.1-91: Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete	Methods for selecting and adjusting proportions for hydraulic cement concrete made with and without other cementitious materials and chemical admixtures	Footnotes 3, 6,10	Fly Ash, Natural Pozzolans, Ground Granulated Blast-Furnace Slag	Hydraulic Cement Concrete with Normal and/or High Density Aggregates
211.4R-08: Guide for Selecting Proportions for High-Strength Concrete Using Portland Cement and Other Cementitious Materials	Methods for selecting mixture proportions for high-strength concrete and optimizing these mixture proportions on the basis of trial batches	Footnotes 3, 6, 25	Fly Ash, Silica Fume, Slag Cement (Ground Granulated Blast-Furnace Slag)	High-Strength Concrete
212.3R-04: Chemical Admixtures for Concrete	Chemical admixtures are classified into five groups: air-entraining; accelerating; water-reducing and set-controlling; admixtures for flowing concrete; and miscellaneous	Footnotes 3, 6	Fly Ash, Natural Pozzolan, Silica Fume	Grout, Concrete
214R-02: Evaluation of Strength Test Results of Concrete	Assess results of concrete strength tests	Footnotes 3, 6, 26		Concrete
226.1R-87: Ground Granulated-Blast Furnace Slag as a Cementitious Constituent in Concrete	Composition and production of ground granulated blast furnace slag, its use in concrete, and its effects on the properties of concrete. The report addresses the use of ground granulated blast furnace slag as a cementitious material added along with Portland cement in the production of concrete.	Footnotes 3, 6, 11	Ground Granulated Blast-Furnace Slag	Concrete

ACI - Standard Specification/Guideline	Description	Source	Recycled Material	Application
229R-99: Controlled Low-Strength Materials (CLSM)	Provides basic information on CLSM technology, with emphasis on CLSM material characteristics and advantages over conventional compacted fill	Footnotes 3, 5, 6, 8, 15	Foundry Sands, Fly Ash, Blended Cement, Glass Cullet, Reclaimed Crushed Concrete, Pond Ash (Mixture of Fly Ash and Bottom Ash)	Backfill, Structural Fill, Flowable Fill, Unshrinkable Fill, Controlled Density Fill, Flowable Mortar, Pavement Bases, Plastic Soil-Cement, Soil-Cement Slurry, Bedding Material for Conduit, Erosion Control, Void Filling, Nuclear Facilities, Bridge Reclamation
232.1R-00: Use of Raw or Processed Natural Pozzolans in Concrete	Provides a review of the state-of-the-art use of raw or processed natural pozzolans in concrete and an overview of the properties of natural pozzolans and their proper use in the production of hydraulic-cement concrete	Footnotes 3, 8, 14	Fly Ash, Natural Pozzolans	Concrete, Hydraulic-Cement Concrete, Grouts, Mortars, CLSM
232.2R-03: Use of Fly Ash in Concrete	Overview of the origin and properties of fly ash, its effect on the properties of hydraulic cement concrete, and the proper selection and use of fly ash in the production of hydraulic cement concrete and concrete products	Footnotes 3, 6, 12	Fly Ash	Mineral Admixture in Portland Cement Concrete, Grout, Mortars, CLSM, Solidification/Stabilization
301-05: Specifications for Structural Concrete	Specification covers cast-in-place structural concrete	Footnotes 3, 6, 27	Blended Hydraulic Cement, Fly Ash, Natural Pozzolans, Ground Granulated Blast-Furnace Slag, Silica Fume	Concrete

ACI - Standard Specification/Guideline	Description	Source	Recycled Material	Application
305R-99: Hot Weather Concreting	Defines hot weather, lists potential problems, and presents practices intended to minimize them	Footnotes 3, 6, 17	Fly Ash, Pozzolans, Ground Granulated Blast-Furnace Slag, Crushed Coarse Aggregate	Architectural, Lightweight, Mass, and Prestressed Concretes
306R-88: Cold Weather Concreting	Describes construction procedures that can result in concrete placed in cold weather of sufficient strength and durability. Provides valuable charts and graphs, as well as discussion of construction methods, protective coverings, temperature recording procedures, and material requirements.	Footnotes 3, 6, 18	Slag and/or Glass Can Be Used as a Loose Fill or Blanket	Concrete
363R-92: State-of-the-Art Report on High-Strength Concrete	Selection of materials, concrete mix proportioning, batching, mixing, transporting, placing, curing, control procedures, concrete properties, structural design, economics, and applications of high strength concrete	Footnotes 3, 6, 13	Fly Ash, Slag Cement, Silica Fume	Portland Cement Concrete
363.2R-98: Guide to Quality Control and Testing of High-Strength Concrete	Guide discusses quality control and testing practices of high-strength concrete, and is an extension of ACI 363R.	Footnotes 3, 6, 16	Fly Ash, Slag, Silica Fume, Coarse and Fine Aggregate; does not exclude other innovative and local materials	High Strength Concrete

Table 4. Federal Highway Administration (FHWA) Guidelines

FHWA - Guidelines	Description	Source	Recycled Material	Application
FHWA-1f-03-019: Fly Ash Facts for Highway Engineers: Chapter 9, Fly Ash Grouts for Pavement Subsealing	Covers the use of fly ash as a mineral admixture to Portland cement concrete. It also discusses the benefits to using fly ash, the mix design and specification requirements, the properties of fly ash and how fly ash meets the design requirements and construction practices.	Footnotes 4, 5, 6	Fly Ash	Soil Stabilization, Waste Solidification, Structural Fill, Flowable Fill, Grout, Mineral Filler in Asphalt Paving, Mineral Admixture in Portland Cement Concrete
FHWA-RD-97-148: User Guidelines for Byproduct and Secondary Use Materials in Pavement Construction	The primary purpose of this guidance document is to assist those who have an interest in using or increasing their understanding of the types of by-product materials that may be recovered and used in highway construction applications. It provides the user with sufficient information on each material included, general guidance on engineering evaluation requirements, environmental issues, and economic considerations for determining the suitability of using recovered materials in highway applications.	Footnotes 4, 5, 6	FGD, Bottom Ash, Boiler Slag, Fly Ash, Foundry Sands	Soil Stabilization, Waste Solidification, Granular Base, Fine Aggregate in Asphalt Paving, Structural Fill, Flowable Fill, Mineral Filler in Asphalt Paving, Fine Aggregate in Asphalt Paving

Table 5. Colorado Department of Transportation Standard Specifications

Colorado DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 202 Removal of Structures and Obstructions				
202.02 General	Concrete and asphalt removed from the project may be used to construct embankments	Concrete, Asphalt	Embankments	
202.03 Salvable Materials	Salvable material becomes property of CDOT or it can be reused on a project			
202.07 Pavements, Sidewalk, Curbs	Gives instructions for breaking concrete pavements to be left in place	Concrete	Pavement, Sidewalks, Curbs, Gutters	
203.02 (e) Borrow	Borrow shall consist of approved material obtained from outside the right of way, required for the construction of the project.			
Section 203 Excavation and Embankment				
203.03 (a) Embankment Material	Tested and approved material from excavations can be used to construct embankments		Embankments	
203.04 Construction Requirements - General	Provides grading instructions when concrete surfacing materials are to be placed directly on subgrade	Concrete	Excavations, Embankments	
203.05 (f) Potholing	Backfill the excavation with the excavated or other approved materials		Backfill	Meet Requirements of Subsection 206.03
203.06 Embankment	Broken concrete and asphalt removed from the project can be used in embankments	Concrete, Asphalt	Embankments	
Section 206 Excavation and Backfill for Structures				
206.02 General - (a) Structure Backfill	Fly ash may be substituted for cement. Recycled glass cullet can be used for the aggregate. Glass must conform to required gradations.	Fly Ash, Recycled Glass Cullet	Structural Backfill	Meet Requirements of Subsection 703.08

Colorado DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
206.02 General - (b) Bed Course Material	Crushed slag, crushed reclaimed concrete, or asphalt may be used as aggregate base course	Slag, Reclaimed Concrete, Reclaimed Asphalt	Bed Course Material	Meet Requirements of Subsections 703.03 and 703.07
206.02 General - (c) Filter Material	Slag can be used for a filter material	Slag	Filter Material	Meet Requirements of Subsection 703.09
206.03 Structure Excavation and Structure Backfill	Unsuitable foundation material that is suitable for embankments, shall be used to construct embankments	Foundation Material	Embankments	
Section 208 Erosion Control				
208.02 Materials - (e) Brush Barrier	Unmerchantable timber used for brush barriers	Waste Wood	Brush Barriers	
208.02 Materials - (f) Check Dam	Allows for use of logs or wooden timbers in check dams	Wood	Check Dams	
208.02 Materials - (l) Stabilized Construction Entrance	Course material required which could be crushed concrete or asphalt	Concrete, Asphalt	Aggregate	Meet Requirements of Subsection 420.02
Section 210 Reset Structures				
210.02 General	Materials in good condition from removed structures may be reused			
210.04 Fences and Gates	When relocating, panels, gates, and wire can be removed and reset at the new location		Fences, Gates	
Section 213 Mulching				
213.01 Description	Mulch consisting of wood cellulose fiber and other approved materials can be used	Waste Wood	Mulch	
Section 250 Environmental Health & Safety				
250.04 Heavy Metal Based Paint Management (f)	All painted steel components shall be recycled for future use, unless designated to be salvaged.	Steel		

Colorado DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 304 Aggregate Base Course				
304.02 Aggregate	Certain crushed reclaimed material can be used as an aggregate for base courses	Slag, Reclaimed Concrete, Reclaimed Asphalt		Meet Requirements of Subsection 703.03
304.03 Commercial Mineral Fillers	Portland cement can be substituted with fly ash	Fly Ash	Portland Cement	Meet Requirements of Subsection 701.01
Section 401 Plant Mix Pavements - General				
401.02 Composition of Mixtures	Reclaimed material can be used if permitted	Concrete, Asphalt		
401.03 Aggregates	Approved materials can be used to make a variety of aggregates	Slag, Reclaimed Concrete, Reclaimed Asphalt	Aggregate	Meet Requirements of Section 703
401.04 Mineral Filler	Slag dust and fly ash can be used	Slag Dust, Fly Ash		Meet Requirements of Subsection 703.06
401.06 Asphalt Cement	Crumb rubber modifier (CRM) can be used in the asphalt-rubber binder	High Float Emulsified Asphalt, Emulsified Recycling Agent, Crumb Rubber Modifier	Hot and Cold Bituminous Pavements	Meet Requirements of Section 702
Section 403 Hot Mix Asphalt				
403.01 Description	Hot mix pavement can be made of a mixture of aggregates, asphalt cement, and/or filler	Aggregate, Asphalt Cement, Filler	Hot Mix Asphalt	
403.02 Materials	Specifies materials that can compose hot mix asphalt (HMA)	Concrete, Asphalt, Slag, Slag Dust, Fly Ash, High Float Emulsified Asphalt, Emulsified Recycling Agent	Hot Mix Asphalt	Meet Requirements of Subsections 401.02 - 401.06
Section 405 Heating and Scarifying Treatment				

Colorado DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
405.01 Description	Recycle the top portion of existing bituminous pavements	Asphalt Pavement	Asphalt Pavement	
Section 406 Cold Bituminous Pavement (Recycle)				
406.02 Materials	Recycling portions of bituminous surfaces	High Float Emulsified Asphalt, Recycling Agent	Cold Bituminous Pavement	Meet Requirements of Subsection 702.03
406.04 - 406.11	Provides procedures for cold recycling of bituminous surfaces	Bituminous Material	Cold Bituminous Pavement	
Section 409 Seal Coat				
409.03 Cover Coat Material	Coat cover aggregate can be crushed slag	Blast-Furnace Slag	Cover Coat	Meet Requirements of Subsection 703.05
Section 411 Bituminous Materials				
411.02 Materials	Bituminous materials can be made of high float emulsified asphalt and emulsified recycling agent	High Float Emulsified Asphalt, Emulsified Recycling Agent	Bituminous Materials	Meet Requirements of Section 702
Section 412 Portland Cement Concrete Pavement				
412.02 Materials	Allows fly ash use in Portland cement concrete and slag as coarse aggregate according to certain requirements	Fly Ash, Slag	Coarse Aggregate, Portland Cement Concrete Pavement	Meet Requirements of Subsections 701.01, 701.02, 703.01, 703.02
Section 503 Drilled Caissons				
503.02 Materials	Approved fly ash may be substituted for Portland cement up to a maximum of 20% Class C or 30% Class F by weight	Fly Ash	Portland Cement Concrete	Meet Requirements of Section 601
Section 504 Cribbing				

Colorado DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
504.02 Materials	Backfill can be used with any of the approved recycled materials	Fly Ash, Recycled Glass Cullet, Slag, Reclaimed Concrete, Reclaimed Asphalt	Backfill	Meet Requirements of Section 206
Section 507 Slope and Ditch Paving				
507.02 Concrete Slope and Ditch Paving Materials	Concrete can be made with fly ash. Approved fly ash may be substituted for Portland cement up to a maximum of 20% Class C or 30% Class F by weight.	Fly Ash	Concrete	Meet Requirements of Section 601
507.04 Grouted Rubble Slope and Ditch Paving	Mortar consists of Portland cement and fine aggregate	Fly Ash	Mortar, Portland Cement Concrete	Meet Requirements of Section 601 for Class B concrete; meet Subsections 701.01 and 703.01
507.05 Grouted Riprap Slope and Ditch Paving	Concrete mortar can be made with fly ash. Approved fly ash may be substituted for Portland cement up to a maximum of 20% Class C or 30% Class F by weight.	Fly Ash	Concrete Mortar, Grouted Riprap Slope and Ditch Paving	Meet Requirements of Section 601
Section 601 Structural Concrete				
601.02 Classification	Approved percentages of fly ash may be substituted for Portland cement for different classes of concrete	Fly Ash, Silica Fume	Concrete	
601.03 Materials	Fly ash and silica fume may be used as substitutes for Portland cement for concrete according to certain requirements	Fly Ash, Silica Fume	Concrete	Meet Requirements of Subsections 701.01, 701.02, 701.03
Section 604 Manholes, Inlets, and Meter Vaults				

Colorado DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
604.02 Materials	Concrete for these structures can be made with fly ash. Approved materials such as pozzolan and blast furnace slag can be used for concrete brick and concrete masonry blocks.	Fly Ash, Pozzolan, Blast-Furnace Slag	Bricks, Masonry Blocks, and Concrete	Meet Requirements of Sections 601, and Subsections 704.02, and 704.03
Section 605 Subsurface Drains				
605.02 Materials	Filter material may contain slag	Slag	Subsurface Drains	Meet Requirements of Subsection 703.09
Section 606 Guardrail				
606.02 Materials	Concrete for precast or cast-in-place barrier can be made with fly ash or silica fume	Fly Ash, Silica Fume	Concrete for Guardrails	Meet Requirements of Section 601
Section 608 Sidewalks and Bikeways				
608.02 Materials	Allows slag or other approved materials for bed course material. Concrete can be made with approved fly ash and silica fume.	Slag, Fly Ash, Silica Fume	Bed Course for Curbs and Gutters, Concrete	Meet Requirements of Subsection 703.07 and Section 601
Section 609 Curb & Gutter				
609.02 Materials	Allows slag or other approved materials for bed course material. Concrete can be made with approved fly ash and silica fume.	Slag, Fly Ash, Silica Fume	Bed Course Material, Concrete	Meet Requirements of Subsection 703.07 and Section 601
Section 610 Median Cover Material				
610.02 Materials	Bituminous median cover material shall conform to requirements for hot mix asphalt. Concrete can be made with fly ash or silica fume.	Fly Ash, Silica Fume, Concrete, Asphalt, Slag, Slag Dust, High Float Emulsified Asphalt, Emulsified Recycling Agent	Concrete, Bituminous Median Cover Material	Meet Requirements of Sections 403 and 601
Section 611 Cattle Guards				

Colorado DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
611.02 Materials	Concrete can be made with fly ash or silica fume	Fly Ash, Silica Fume	Concrete for Cattle Guards	Meet Requirements of Section 601
Section 614 Traffic Control Devices				
614.02 Sign Posts and Sign Structures	Concrete can be made with fly ash or silica fume	Fly Ash, Silica Fume	Concrete	Meet Requirements of Section 601
614.08 (g) Traffic Signal Poles	Specifies requirements for all traffic signal poles, mast arms, and concrete foundations. Concrete can be made with fly ash or silica fume.	Fly Ash, Silica Fume	Traffic signal poles, mast arms, concrete foundations	Meet Requirements of Sections 601, 613, 713, and 715
Section 616 Siphons				
616.05 Drain Pipe	Concrete can be made with fly ash or silica fume	Fly Ash, Silica Fume	Concrete pipe for drain	Meet Requirements of Section 601
Section 618 Prestressed Concrete				
618.02 (c) Concrete for Pretensioned and Combination Tensioned Products	Allows fly ash use in concrete according to certain requirements	Fly Ash	Concrete	Meet Requirements of Subsections 701.01, 701.02, 703.01, 703.02
618.02 (d) Concrete and Steel for Other Members	Concrete can be made with fly ash or silica fume.	Fly Ash, Silica Fume	Concrete	Meet Requirements of Section 601
618.11 (a) Concrete for Pretensioned and Combination Tensioned Products	Fly ash can substitute Portland cement up to a maximum of 25% by weight	Fly Ash	Portland Cement	
Section 622 Rest Areas and Buildings				
622.04 Construction Materials	Backfill can be used with any of the approved recycled materials. Concrete can be made with fly ash or silica fume.	Fly Ash, Recycled Glass Cullet, Silica Fume	Backfill, Concrete	Meet Requirements of Section 206 and 601

Colorado DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 623 Irrigation System				
623.16 Excavation and Backfill	Backfill can be used with any of the approved recycled materials	Fly Ash, Recycled Glass Cullet, Slag, Reclaimed Concrete, Reclaimed Asphalt	Backfill	Meet Requirements of Section 206 and Subsection 703.08(b)
Section 701 Hydraulic Cement				
701.01 Portland Cement	Fly ash may be substituted for Portland cement	Fly Ash	Portland Cement	ASTM C 595
701.02 Fly Ash	Fly ash use for concrete must meet requirements for each application and test requirements	Fly Ash	Concrete	ASTM C 618, TCLP
701.03 Silica Fume	Silica fume for concrete must meet requirements and testing	Silica Fume	Concrete	ASTM C 1240
Section 702 Bituminous Materials				
702.01 (a) 1 Paving Asphalt and Modifiers	Allows the use of an asphalt-rubber binder	Asphalt-Rubber Binder	Bituminous Materials	
702.01 (a) 2 Crumb Rubber Modifier (CRM)	Allows the use of crumb rubber modifier (CRM)	Crumb Rubber Modifier	Bituminous Materials	
702.01 (a) 3 Asphalt-Rubber Binder	Allows the mixture of asphalt-rubber binder and crumb rubber modifier	Asphalt-Rubber Binder, Crumb Rubber Modifier	Bituminous Materials	
702.01 (c) Crumb Rubber Modifier	Crumb rubber modifier is made of scrap automobile tires, truck tires, tire buffing or a combination.	Scrap Tires	Crumb Rubber Modifier	ASTM C 136
702.03 (c) Recycling Agent	Recycling Agent for Section 406, Cold Bituminous Pavement (Recycle)	High Float Emulsified Asphalt or Emulsified Recycling Agent	Recycling Agent	Meet Requirements of Table 702-6 and Table 702-7
702.05 Recycling Agents	Recycling agents must conform to physical and chemical requirements	Recycling Agents	Bituminous Materials	Meet Requirements of Table 702-9
Section 703 Aggregates				

Colorado DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
703.02 Coarse Aggregate for Concrete	Allows crushed concrete or blast furnace slag as coarse aggregate	Crushed Blast Furnace Slag, Crushed Concrete	Coarse Aggregate	AASHTO M 80
703.03 Aggregate for Bases	Crushed slag, crushed reclaimed concrete or asphalt may be used to substitute some aggregate	Crushed Slag, Crushed Reclaimed Concrete or Asphalt	Aggregate	AASHTO M 147
703.04 Aggregates for Hot Mix Asphalt	Allows use of crushed slag as aggregates for hot plant mix bituminous pavement	Slag	Hot Mix Asphalt	AASHTO T 96 AASHTO T 304 AASHTO T 90
703.05 Aggregate for Cover Coat Material	Allows slags to be used as aggregate for cover coat material	Blast Furnace Slag (air-cooled)	Cover Coat	AASHTO T 96 AASHTO T 19
703.06 Mineral Filler	Allows use of slag dust, fly ash, or other approved materials for mineral filler	Slag Dust, Fly Ash	Mineral filler	AASHTO M 17
703.07 Bed Course Material	Allows use of slag and other approved materials for bed course materials	Slag	Bed Course	
703.09 Filter Material	Allows use of slag and other approved free draining materials for filter material	Slag	Filter Material	
Section 715 Lighting Materials				
715.02 Concrete Foundation Pads	Concrete can be made with fly ash or silica fume	Fly Ash, Silica Fume	Concrete	Meet Requirements of Section 601
References:				
http://fhwapap04.fhwa.dot.gov/nhswp/browseStandardSpecs.jsp				
http://www.dot.state.co.us/publications/pdffiles/epagrant.pdf				
Edition Year 2005				

Table 6. Montana Department of Transportation Standard Specifications

Montana DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 202 Removal of Structures and Obstructions				
202.03.1 (C) (2) Concrete and Masonry	Allows use of concrete and masonry removed from old structures	Concrete, Masonry	Embankments, Backfills	Meet Requirements of Section 203
202.03.3 Removal of Pavement, Concrete, and Masonry	Allows one to process, handle, and transport existing bituminous or Portland cement concrete pavement to be removed to use in embankments, or as base or traffic gravel. Existing pavement must meet specifications.	Portland Cement Concrete	Embankments, Base, Gravel	
Section 203 Excavation and Embankment				
203.01.2 Embankment	Place excavation materials in roadway embankments, dikes, and areas where unsuitable material is removed, holes, pits, and other roadway depressions		Embankments	
203.03.1 (C) Excavation	Excavation can be backfilled with approved materials		Backfill	
203.03.2 (G) Disposal of Unsuitable or Excess Materials	Places unsuitable or excess materials in embankments in side slopes of the nearest fill.		Embankments	Meet Requirements of Subsections 106.02.5 and 107.11
Section 204 Existing Surface Preparations				
204.03.1 Subgrade	Excavation of roadway subgrade is backfilled with approved materials		Backfill	
Section 209 Structure Excavation				
209.03.1 General	Remove and stockpile all excavated material that is suitable for backfill		Backfill	
Section 304 Portland Concrete Treated Base				

Montana DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
304.02.1 Portland Cement	Use Portland cement and blended hydraulic cement that meets requirements	Fly Ash, Foundry Sands	Subgrade, Base Course	Concrete: Section 551; Type I or II Portland cement ASTM C 150 or AASHTO M 85; Requirements of Subsection 551.02.1; Aggregates Subsections 701.01.1 and 701.01.2
Section 551 Portland Cement Concrete				
551.02.10 Fly Ash	When included in the mix design, furnish fly ash meeting AASHTO M 295 Mineral Admixture Class C or Class F	Fly Ash	Portland Cement Concrete	AASHTO M 295; Table 1 Chemical Requirements and Table 3 Physical Requirements
551.02.13 Ground Granulated Blast Furnace Slag	When included in the mix design, furnish ground granulated blast furnace slag	Ground Granulated Blast Furnace Slag	Portland Cement Concrete	AASHTO M 302
551.03.1 (I) Flowable fill	Controlled low-strength material for bedding, encasement, and general backfill for trenches		Bedding, Encasement, and Backfill for Trenches	
551.03.2 (A) (4) (a) Design	Fly ash may be included in the mix design for up to 20% by weight of the total cementitious material	Fly Ash	Portland Cement Concrete	AASHTO M 85; Table 1
551.03.2 (A) (4) (d) Design	Ground granulated blast furnace slag may be used in the mix design, up to 20% by weight of	Ground Granulated Blast Furnace Slag	Portland Cement Concrete	

Montana DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
	the total cementitious material			
551.03.2 (E) Flowable Fill	Mixture of Portland cement, fly ash, fine aggregate, air entraining admixture, and water with low cementitious content for reduced strength development	Fly Ash	Portland Cement Concrete	Aggregates Meet Requirements of Subsection 701.01.1
Section 701 Aggregates				
701.01.2 (A) Coarse Aggregate for Concrete - General Requirements	Crushed stone, gravel, blast-furnace slag and other approved materials with similar characteristics or combinations of the above materials may be used	Blast Furnace Slag or Other Approved Materials	Coarse Aggregate	
701.04.1 Bedding Materials	Glass cullet may be used as blending material to furnish bedding material for minor drainage structures and culvert foundations	Glass Cullet	Bedding Material	
701.11 Glass Cullet for Soil-Aggregate Filler	Allows no more than 20% of the glass cullet in the total blended product to be used for soil-aggregate filler	Waste Glass	Soil Aggregate Filler	AASHTO M 318; others specified
Section 705 Guardrail and Guide Posts				
705.01.4 Lightweight Concrete Guardrail Posts	Blast furnace slag may be used to produce both fine and course aggregates for lightweight concrete	Blast Furnace Slag	Aggregates for Lightweight Concrete	Meet AASHTO M 195 Aggregate Requirements; Meet Requirements of Section 711
Section 713 Miscellaneous Materials				
713.06 Mineral Filler	Defines mineral filler as Portland cement, ground limestone dust, fly ash, or graded fines free of silt or clay produced from crushing stone, gravel, slag, or other non-plastic mineral matter	Fly Ash	Mineral Filler	Others specified

Montana DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
References:				
http://fhwapap04.fhwa.dot.gov/nhswp/browseStandardSpecs.jsp				
http://www.mdt.mt.gov/business/contracting/standard_specs.shtml				
http://www.mdt.mt.gov/other/contract/external/standard_specbook/2006/2006_stand_specs.pdf				
Edition Year 2006				

Table 7. North Dakota Department of Transportation Standard Specifications

North Dakota DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 202 Removal of Structures, Obstructions, Surfacing and Miscellaneous				
202.02 D. Removal of Pavement, Sidewalks, Curbs, etc.	Removal and salvage of Portland cement concrete pavement and bituminous pavement	Concrete	Portland Cement Concrete Pavement	Meet Requirements of Section 560
Section 210 Structural Excavation, Structural Fill and Foundation Preparation				
210.02 A. Materials - Ordinary Backfill	Any approved material obtained from borrow excavation can be used		Backfill	
210.03 Construction Requirements	Excavated materials can be approved for use in backfill		Backfill	
Section 230 Reshaping Roadway and Subgrade Preparations				
230.02 A. Reshaping Roadway, Shoulders, and Inslopes	Approved materials can be used to fill holes and depressions		Fill	
Section 234 Stabilized Subgrade				
234.02 Materials	Allows the use of fly ash in lime-fly ash	Fly Ash	Stabilized Subgrade	Meet Requirements of Section 820
234.04 A. Spreading	Lime-Fly ash spread according to certain regulations	Fly Ash	Stabilized Subgrade	
Section 302 Salvaged Base Course, Aggregate Base Course or Aggregate Surface Course				
302.02 Materials	Allows the use of salvaged materials	Salvaged Materials	Aggregate	Meet Requirements of Section 817
306 Blended Base Course				
306.01 Description	Creates a base aggregate material out of other aggregate materials such as existing aggregate base, existing bituminous surfacing and other course aggregates	Approved Materials		Meet Requirements of Section 816
Section 407 Hot Recycled Bituminous Pavement				

North Dakota DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
407.01 Description	Processing and placing salvaged bituminous material on the roadway	Bituminous Material	Roadway Pavement	
407.02 A, D. Materials	Allows the use of salvaged bituminous material and recycling agents in hot recycling bituminous pavement mix	Recycling Agent, Salvaged Bituminous Material		Meet Requirements of Section 818
407.04 D. Mix Design	Aggregate or Asphalt can be incorporated into the mix	Aggregate, Asphalt	Bituminous Material	
407.04 G. Mixing	Salvaged bituminous materials, recycling agent, and virgin aggregate are mixed	Bituminous Material, Recycling Agent	Recycled Hot Bituminous Material	
Section 550 Portland Cement Concrete Pavement				
550.02 B. Portland Cement Concrete	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Section 802
Section 560 Recycled Portland Cement Concrete Pavement				
560.01 Description	Removing, crushing, screening, and stockpiling Portland cement concrete pavement into the required gradation, and adding new materials to produce Portland cement concrete pavement	Reclaimed Concrete	Portland Cement Concrete Pavement	Meet Requirements of 550 and 802
560.02 Materials	Specifies materials to be used	Fly Ash, Reclaimed Concrete	Portland Cement Concrete Pavement	Meet Requirements of 550 and 802
Section 560 Recycled Portland Cement Concrete Pavement				
560.02 Materials	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of 550 and 802
560.04 F. Mixing	Allows the use of salvaged concrete to be used in Portland cement concrete pavement	Salvaged Concrete	Portland Cement Concrete Pavement	Meet Requirements of Section 802
Section 570 Portland Cement Concrete Pavement Repair				
570.02 Materials	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Section 802

North Dakota DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 602 Concrete Structures				
602.03 B. (4) Barriers	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Section 802
Section 604 Prestressed Concrete Beams				
604.02 A. Concrete for Beams	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Section 802
604.04 C. Placing Concrete	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Sections 602 and 802
Section 622 Piling				
622.03 G. (1) Filling With Concrete	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Section 802
Section 650 Repair and Overlay of Portland Cement Concrete Bridge Decks with Low-Slump Concrete or Latex-Modified Concrete				
650.02 Materials	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Section 802
Section 714 Culverts, Storm Drains, Edge Drains and Underdrains				
714.02 D. Materials - Bridge Approach Drains	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Section 802
714.03 A. (6) Backfilling for Pipe Installed in Embankments	All suitable excavated material may be used for backfilling. Other unsuitable material shall be placed on the slopes of the roadway embankment.		Backfill and Embankment	
Section 720 Monuments and Right of Way Markers				
720.02 Materials	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Section 802
Section 722 Manholes, Catch Basins and Inlets				
722.02 Materials	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Section 802

North Dakota DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 748 Curb and Gutter				
748.02 Materials	Concrete, containing fly ash, can be used as a material in curbs and gutters	Fly Ash	Concrete	Meet Requirements of Section 802
Section 750 Sidewalks and Driveways				
750.02 Materials	Concrete, containing fly ash, can be used as a material in sidewalks and driveways	Fly Ash	Concrete	Meet Requirements of Section 802
Section 752 Fencing-Installation and Resetting				
752.01 Description	Removal and resetting existing fences and gates approved by the engineer or according to the plans			
752.02 Materials	Concrete, containing fly ash, can be used to set the posts of the fence	Fly Ash	Concrete	Meet Requirements of Section 802
Section 754 Highway Signs				
754.02 B. Materials - Concrete	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Section 802
Section 764 Guardrail				
764.02 Materials	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Section 802
764.03 A. Construction Requirements - General	Post holes are filled with approved backfill materials		Backfill	
Section 772 Highway Traffic Signals				
772.02 H. Materials - Concrete Foundation	Allows fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Section 802
Section 802 Portland Cement Concrete				
802.01 A. Description - General	Fly ash portions used in making Portland cement concrete	Fly Ash	Portland Cement Concrete	Meet Requirements of Section 802
802.01 C. (6) Fly Ash	Fly ash replacement of cement is allowed on a 1:1 ratio, up to a maximum of 30% by weight	Fly Ash	Portland Cement Concrete	Meet Requirements of Section 802

North Dakota DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
802.02 B. Materials	Allows fly ash to be used in the concrete. Allows approved materials to be use as a coarse aggregate.	Fly Ash	Portland Cement Concrete, Aggregate, Cement	Meet Requirements of Subsections 820.01 and 816.02, and Section 804
Section 816 Aggregates				
816.02 A. Coarse Aggregate for Concrete - General	Allows approved materials to be use as a coarse aggregate	Approved Materials	Coarse Aggregate	
816.03 Aggregate for Surfacing, Base, Asphalt Mixes, Blotter, and Seal Coats	Allows the use of salvaged materials to be used in aggregates and can substitute virgin materials	Salvaged Materials	Aggregates	Meet Requirements of Sections 302 and 817
Section 817 Salvaged Base Course				
817.01 General Requirements	Salvaged base may be composed of the following materials: processed virgin aggregate, existing aggregate base, existing bituminous material, stockpiled bituminous material, existing concrete material, and/or stockpiled concrete material	Reclaimed Aggregate, Reclaimed Bituminous Material, Reclaimed Asphalt, Reclaimed Concrete	Base Course	
817.02 Bituminous Combined Material	Provides different ways to incorporate bituminous material into the mixture	Bituminous Material	Base Course	
817.03 Concrete Combined Material	Provides different ways to incorporate concrete material into the mixture	Reclaimed Concrete	Base Course	Meet Requirements of Section 817
Section 820 Fly Ash				

North Dakota DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
820.01 General	Allows fly ash in different types of applications. Fly ash produced at plants where the limestone injection process is used for controlling air pollutants will be considered unacceptable for use in Portland cement concrete.	Fly Ash	Portland Cement Concrete, Lime Fly Ash Treated Subgrade, Econocrete, Aggregate Base	AASHTO M 295 ASTM C 593
Section 826 Joint Materials				
826.02 A. (1) Materials - Hot Applied Joint Sealant Type 1	Allows a mixture of crumb tire rubber and asphalt cement to be use in a sealant-rubber mixture. Crumb tire rubber added shall be 12% of the total weight of the sealant-rubber mixture.	Crumb Tire Rubber, Asphalt Cement	Sealant-Rubber	AASHTO M 20 AASHTO M 226 AASHTO M 173
Section 830 Pipe				
830.01 C. Precast Reinforced Concrete Manhole Sections	Any of the recycled materials can be made into concrete which can be constructed into circular precast reinforced concrete manholes	Fly Ash, Portland Blast-Furnace Slag Cement, Portland-Pozzolan Cement	Concrete	AASHTO M 199
References:				
http://fhwapap04.fhwa.dot.gov/nhswp/browseStandardSpecs.jsp				
http://www.dot.nd.gov/manuals/environmental/2008-Vol01.pdf				
Edition Year 2002				

Table 8. South Dakota Department of Transportation Standard Specifications

South Dakota DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 260 Granular Base and Surfacing				
260.3 A. Construction Requirements - Subbase and Base Course	Recycled Portland cement concrete pavement used as granular base material when requirements are met	Recycled Portland Cement Concrete	Granular Base	
Section 270 Salvaging, Processing and Stockpiling Granular Base and Asphalt Concrete Mix Materials				
270.1 Description	Salvaging, processing, and stockpiling salvaged material from the existing roadway	Granular Material, Asphalt Concrete Mix, Asphalt Mix, Granular Base		
Section 320 Asphalt Concrete, General				
320.2 B. Materials - Aggregate	Fly ash can be used in a mineral filler when making aggregate	Fly Ash	Aggregate	Meet Requirements of Section 880
320.3 B. (3) (a) Drum Mix Plants	Allows use of recycled asphalt (RAP) when specified	Recycled Asphalt	Mix	
Section 321 Asphalt Concrete- Class D, E, G				
321.2 Materials	Allows reclaimed asphalt pavements (RAP) for construction of one or more courses of asphalt concrete on a prepared surface if specified in the plan	Recycled Asphalt Pavement	Asphalt Concrete	Meet Requirements of Subsection 320.2
Section 326 Asphalt Concrete- Class HR				
326.2 Materials	Asphalt concrete aggregates shall consist of salvaged asphalt mix material and virgin aggregate	Recycled Asphalt Aggregate	Concrete	
Section 370 Cold Recycling of Asphalt Concrete				
370.1 Description	Milling asphalt pavement, mixing the reclaimed asphalt pavement (RAP) material with emulsified asphalt, placing and compacting the	Recycled Asphalt	Asphalt Concrete	

South Dakota DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
	recycled mixture, and paving.			
Section 380 Portland Cement Concrete Pavement				
380.2 K. Materials - Fly Ash	Fly ash is used for Portland cement concrete pavement	Fly Ash	Portland Cement Concrete Pavement	Meet Requirements of Sections 605 and 753
Section 390 Concrete Spall Repair				
390.2 A. (3) Materials - Sand	Blast furnace slag used in the sand materials	Blast Furnace Slag	Concrete	Meet Requirements of Subsection 810.1
Section 391 Undersealing				
391.2 A. Materials - Design Mix	Approval must be made to allow fly ash to be used in the design mix for grout	Fly Ash	Grout	
391.2 C. Fly Ash	Fly ash is used to make grout	Fly Ash	Grout	Meet Requirements of Section 753
Section 392 Pavement Jacking				
392.2 A. Materials - Jacking Slurry Design Mix	Approval must be made to allow fly ash to be used in the design mix for grout	Fly Ash	Grout	
392.2 C. Materials - Fly Ash	Allows the use of fly ash	Fly Ash		Meet Requirements of Section 753
Section 420 Structure Excavation				
420.3 C. Disposal of Excavation Material	Excavated material can be used for backfill or embankment		Backfill, Embankment	
Section 450 Pipe Culverts				
450.2 A. Reinforced Concrete Pipe	The concrete used is made with fly ash	Fly Ash	Concrete	Meet Requirements of Section 990
Section 460 Structural Concrete				

South Dakota DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
460.2 J. Materials - Fly Ash	Structural concrete for bridge decks and barrier curbs	Fly Ash	Structural Concrete	Meet Requirements of Section 753
Section 462 Concrete for Incidental Construction- Class M (I)				
462.2 J. Materials - Fly Ash	Fly ash is a material used to make concrete	Fly Ash	Concrete	Meet Requirements of Section 753
Section 465 Drilled Shaft Construction				
465.2 D. Materials - Grout	Allows fly ash as an optional material when creating a grout	Fly Ash	Grout	
Section 560 Precast/Prestressed Concrete				
560.2 A. (5) Materials - Fly Ash	Allows concrete to be made with fly ash	Fly Ash	Concrete	Meet Requirements of Section 753
Section 601 Haul Roads				
601.2 B. Concrete Asphalt Aggregate	Allows fly ash to be used in asphalt concrete aggregate	Fly Ash	Aggregate	Meet Requirements of Section 880
601.2 D. Asphalt Material	Allows fly ash to be used in asphalt material	Fly Ash	Asphalt	Meet Requirements of Section 880
Section 605 Fly Ash				
605.2 Materials	Allows fly ash to be used as a part of the Portland cement concrete mixture	Fly Ash	Portland Cement Concrete Pavement	Meet Requirements of Section 753
605.3 A. (2) Construction Requirements - Limitations: Pozzolan Modified Cement	If pozzolan modified Portland cement is used, the cement and fly ash shall conform to the requirements	Fly Ash		AASHTO M 240
605.3 C. Construction Requirements - Design Mix	Fly ash may be substituted for cement in concrete. The minimum amount of cement to be replaced is 15-20% by weight.	Fly Ash	Cement, Concrete	
Section 620 Right-Of-Way Fencing				

South Dakota DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 620.3 C. Salvage or Removing Fence	Allows the landowners to keep the removed fence			
Section 753 Fly Ash				
not provided	Grout is used for pavement jacking and undersealing	Fly Ash	Grout	AASHTO M 295
Section 800 Fine Aggregate for Use in Portland Cement Concrete				
800.1 General Requirements	Fine aggregate can consist of inert materials similar to natural sand, and are subject to approval		Fine Aggregate	
Section 810 Masonry Mortar Sand and Epoxy Resin Mortar Sand				
810.1 A. Masonry Mortar Sand - General	Blast furnace slag used in the aggregate materials	Blast Furnace Slag	Masonry Mortar	
Section 880 Aggregates for Asphalt Concrete				
880.2 B. (2) Specific Requirements - Class D, E, and G	Fly ash can be used in an aggregate mineral filler	Fly Ash	Mineral Filler	AASHTO T 37
Section 990 Pipe Culverts and Drainage Tubing				
990.1 A. Reinforced Concrete Pipe	Covers the requirements for reinforced concrete pipe and allows for the use of certain industrial materials in the concrete	Fly Ash, Ground Granulated Blast-Furnace Slag. Cement can contain Portland Blast Furnace Slag Cement, Slag Modified Portland Cement, Portland-Pozzolan Cement and Fly Ash	Concrete Pipe	Meet Requirements of Sections 800 and 753. AASHTO M 170 AASHTO M 206 AASHTO M 207
990.1 A. (2) (g) Fly Ash	Allows the use of fly ash for the reinforced concrete pipe	Fly Ash	Concrete Pipe	Meet Requirements of Section 753

South Dakota DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
References:				
http://fhwapap04.fhwa.dot.gov/nhswp/browseStandardSpecs.jsp				
http://www.sddot.com/Operations/Specifications/specbook_div3.htm				
Edition Year 2004				

Table 9. Utah Department of Transportation Standard Specifications

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 1455M Material Quality Requirements				
1455M 1.6 D.	Industrial materials are encouraged to be re-used as long as they meet requirements			
Section 01891 2.1 A. Move Street Signs and Mailbox Assemblies				
01891 2.1 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Natural Pozzolans, Silica Fume	Portland Cement Concrete	Meet Requirements of Section 03055
Section 01892 Reconstruct Catch Basin, Cleanout, Meter Valve, Manhole and Monument Boxes				
01892 2.1 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 02056 Embankment, Borrow and Backfill				
02056 2.1 A. Materials	Allows the use of recycled Portland cement concrete to be used as a backfill material	Recycled Portland Cement Concrete	Backfill	
02056 2.7 Flowable Fill	Allows the use of fly ash and pozzolans to be used as a flowable fill	Fly Ash, Pozzolans	Flowable Fill	Meet Requirements of Section 03575
Section 02082 Water Meter				
02082 2.1 F. Aggregate	Aggregates used for installing water meters must meet requirements for free draining granular backfill borrow, and may include the use of crushed slag	Crushed Slag	Aggregate for Backfill	Meet Requirements of Section 02061
Section 02221 Remove Structure and Obstruction				
02221 1.1 A. General	Allows to remove and salvage materials and obstructions that interfere with the construction			
02221 2.1 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02221 2.2 A. Common Fill	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
02221M 3.22 A. Precast	Allows salvage of concrete materials that are removed	Concrete		
Section 02312 Grading for Landscapes				
02312 2.1 Backfill Materials	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 02316 Roadway Excavation				
02316 3.5 C. Excavation	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
02316 3.5 E. Excavation	Allows suitable granular material that was gathered in excavation to be used in the embankment		Embankment	
02316 3.9 A. Pavement	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 02317 Structural Excavation				
02317 3.3 A. Backfill and Compaction	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 02318 Ditch Excavation				
02318 3.1 B. Small Ditch Excavation	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 02372 Wire Enclosed Riprap				
02372 3.1 C. Preparation	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
02372 3.1 E. Preparation	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a	Fly Ash, Pozzolans, Recycled Portland Cement	Backfill	Meet Requirements of Section 02056

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
	backfill	Concrete		
Section 02374 Grouted Riprap				
02374 2.3 A. Portland Cement	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete, Grout	Meet Requirements of Section 03055
02374 2.3 B. Pozzolans	Allows the use of pozzolans to be used in the grout mixture	Pozzolans	Grout	Meet Requirements of Section 03055 and ASTM C 618
02374 2.3 C. Aggregates	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Aggregate	Meet Requirements of Section 03055
Section 02455 Driven Piles				
02455 2.3 Portland Cement Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02466 Drilled Shafts				
02466 2.1 A. Portland Cement Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02611 Diversion Box Gate and Frame				
02611 2.2 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02624 Approach Slab Catch Basin				
02624 2.1 A. Materials	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02633 Concrete Drainage Structures				
02633 2.1 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02633 2.3 A. Structural Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete and crushed slag to be used in aggregate	Fly Ash, Silica Fume, Natural Pozzolans, Crushed Slag	Portland Cement Concrete, Aggregate	Meet requirements of Section 03310
02633 3.1 D.1. Preparation	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a	Fly Ash, Pozzolans, Recycled Portland Cement	Backfill	Meet Requirements of Section 02056

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
	backfill	Concrete		
Section 02643 Concrete-Lined Ditch				
02643 2.1 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02643 3.1 D. Construction	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 02645 Precast Concrete Box and Three-Sided Culvert Structures				
02645 2.1 A. Wet Cast Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02645 3.1 C. Portland Cement Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02645 3.3 D. Bedding and Backfill	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 02646 Concrete Box Culvert				
02646 2.1 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02646 2.5 A. Granular Backfill Borrow	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
02646 3.1 A. Structural Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 02712 Lean Concrete Base Course				
02712 2.1 A. Cement	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 02721 Untreated Base Course (UTBC)				

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
02721 2.1 A. Aggregates	Allows crushed stone, crushed gravel or crushed slag; free of detrimental and organic matter to be used in aggregate	Crushed Slag	Aggregate	AASHTO T 11 AASHTO T 19 AASHTO T 27 AASHTO T 89 AASHTO T 90 AASHTO T 96 AASHTO T 193
Section 02735S Micro-Surfacing				
02735S 2.3 Mineral Filler	Allows industrial materials to be used	Slag Dust, Hydraulic Cement, Fly Ash	Mineral Filler	AASHTO M 17
Section 02741 Hot Mix Asphalt (HMA)				
02741 1.1 Section Includes	Allows the use of reclaimed asphalt pavement (RAP) to be used in hot mix asphalt	Reclaimed Asphalt Pavement	Hot Mix Asphalt	
02741 2.2 A. Aggregate	Crushed stone, gravel or slag can be used in aggregate	Crushed Slag	Crusher Aggregate	AASHTO T 19 AASHTO T 89 AASHTO T 90 AASHTO T 96 AASHTO T 112 AASHTO T 176 AASHTO T 304 AASHTO TP 61
02741 2.4 Reclaimed Asphalt Pavement (Optional)	Reclaimed asphalt pavement is an optional material in hot mix asphalt.	Reclaimed Asphalt Pavement	Hot Mix Asphalt	AASHTO T 19 AASHTO T 89 AASHTO T 90 AASHTO T 96 AASHTO T 112 AASHTO T 304 AASHTO M 323 AASHTO TP 61
Section 02743 Hot Mix Asphalt-Bike and Pedestrian Paths				

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
02743 2.2 A. Aggregate	Crushed stone, gravel or slag can be used in aggregate	Crushed Slag	Crusher Aggregate	Meet Requirements of Section 02741
02743 3.1 A. Surface Preparation	Crushed stone, gravel or slag can be used in aggregate	Crushed Slag	Crusher Aggregate	Meet Requirements of Section 02741
Section 02748 Prime Coat/Track Coat				
02748 3.1 A. 3. Prime Coat	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 02751 Partial Depth Repair for Concrete Pavements				
02751 2.1 A. 1. Patching Materials	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 02752 Portland Cement Concrete Pavement				
02752 1.5 A. Submittals	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02752 2.1 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 02755 Concrete Slab Jacking				
02755 2.2 A. 3. Portland Cement Dry Mix Design	Allows natural or artificial pozzolans to be used in the standard mix design for jacking and grouting slab	Natural or Artificial Pozzolans	Portland Cement Concrete	ASTM C 618
2.2 B. 2. Portland Cement Dry Mix Design	Allows natural or artificial pozzolans to be used in the optional mix design for jacking and grouting slab	Natural or Artificial Pozzolans	Portland Cement Concrete	ASTM C 618
Section 02771 Curbs, Gutters, Driveways, Pedestrian Access Ramps, and Plowable End Sections				
02771 2.1 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02771 2.7 A. Untreated Base Course	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
02771 3.1 Preparation	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 02776 Concrete Sidewalk, Median Filler, and Flatwork				
02776 2.1 A. Portland Cement Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02776 2.3 A. Untreated Base Course	Allows crushed stone, crushed gravel or crushed slag; free of detrimental and organic matter to be used in aggregate	Crushed Slag	Aggregate	Meet Requirements of Section 02721
02776 2.4 A. Embankment Material	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
02776 3.1 Preparation	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 02786 Open-Graded Surface Course (OGSC)				
02786 2.3 A. Aggregate Materials	Crushed stone, gravel or slag can be used in aggregate	Crushed Slag	Crusher Aggregate	AASHTO T 89 AASHTO T 90 AASHTO T 96 AASHTO T 104 AASHTO T 112 AASHTO T 176 AASHTO T 278 AASHTO T 279 AASHTO T 304 AASHTO TP 61
Section 02812 Pressurized Irrigation Systems				
02812 2.21 Class B Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 02821 Chain Link Fencing and Gates				

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
02821 2.1 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 02822 Right-Of-Way Fence and Gate				
02822 2.10 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 02825 Cattle Guard				
02825 2.2 Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02825 2.4 Aggregate	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
02824 3.1 B. Preparation	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
02824 2.5 A. Borrow	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 02841 W-Beam Guardrail				
02841 2.5 A. 2. b. Concrete Block	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02841 3.3 C. 2. Posts and Blocks	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 02843 Crash Cushions				
02843 3.1 A. 4. Installation	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 02844 Concrete Barrier				
02844 2.1 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 02861 Precast Retaining/Noise Walls				
02861 2.1 Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02861 2.6 Gravel for Post Holes	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 02891 Traffic Signs				
02891 2.1 I. Foundations	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 02892 Traffic Signal				
02892 2.2 B. 1. Foundation	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02892 2.17 A. Flowable Fill	Allows the use of fly ash and pozzolans to be used as a flowable fill	Fly Ash, Pozzolans	Flowable Fill	Meet Requirements of Section 03575
02892 2.18 Hot Mix Asphalt	Allows hot mix asphalt to contain reclaimed asphalt pavement, crushed slag, stone or gravel in the aggregate mix	Crushed Slag, Reclaimed Asphalt Pavement	Hot Mix Asphalt	Meet Requirements of Section 02741
02892 3.2 B. Construct Pole Foundation	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
02892 3.7 F. 4. Install Detector Loops	Allows hot mix asphalt to contain reclaimed asphalt pavement, crushed slag, stone or gravel in the aggregate mix	Crushed Slag, Reclaimed Asphalt Pavement	Hot Mix Asphalt	Meet Requirements of Section 02741
Section 02893 Overhead Sign/VMS Structure				
02893 2.1 B. 1. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 02896 Boundary Survey				
02896 2.2 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 02961 Rotomilling				

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
02961 2.1 A. Materials	Allows hot mix asphalt to contain reclaimed asphalt pavement, crushed slag, stone or gravel in the aggregate mix	Crushed Slag, Reclaimed Asphalt Pavement	Hot Mix Asphalt	Meet Requirements of Section 02741
Section 02962 In-Place Cold Recycled Asphaltic Base				
02962 1.1 Section Includes	Allows existing asphalt material to be used	Reclaimed Asphalt Pavement	Asphaltic Base	
Section 02963 Profile Rotomilling				
02963 2.1 A. Materials	Allows hot mix asphalt to contain reclaimed asphalt pavement, crushed slag, stone or gravel in the aggregate mix	Crushed Slag, Reclaimed Asphalt Pavement	Hot Mix Asphalt	Meet Requirements of Section 02741
02986S In-Place Recycled Asphaltic Base With Solventless Emulsion				
02986S 2.2 B. Sampling and Processing	Uses recycled asphalt pavement for mix design	Recycled Asphalt Pavement	Mix Design	
Section 03055 Portland Cement Concrete				
03055 1.5 A. 2. Submittals	Allows fly ash to be used in trial batches of mix	Fly Ash	Portland Cement Concrete	
03055 2.2 C. Blended Hydraulic Cement	Allows the use of pozzolans in the mix design	Pozzolans	Portland Cement Concrete	
03055 2.6 A. Fly Ash	Allows fly ash to be used in Portland cement concrete	Fly Ash	Portland Cement Concrete	AASHTO M 295
03055 2.6 B. Natural Pozzolans	Allows natural pozzolans or fly ash to be used in Portland cement concrete	Natural Pozzolans, Fly Ash	Portland Cement Concrete	AASHTO M 295 ASTM C 1567
03055 2.6 C. Silica Fume	Allows silica fume to be used in Portland cement concrete	Silica Fume	Portland Cement Concrete	ASTM C 1240
03055 3.3 B. Mix Design	Allows the use of fly ash with a minimum of 20%	Fly Ash	Portland Cement Concrete	
Section 03310 Structural Concrete				
03310 1.5 B. Submittals	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
03310 2.1 C. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 03311 Joint Closure				
03311 2.1 A. Portland Cement Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
03311 3.4 A. Place Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 03339 Precast Concrete Deck Panel				
03339 3.3 G. Preparation and Installation of Structural Non-Shrink Grout	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 03412 Prestressed Concrete				
03412 2.1 C. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 03575 Flowable Fill				
03575 2.1 A. Cement	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
03575 2.1 B. Pozzolans	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
03575 2.2 A. Dry Mix Design	Pozzolans can be used in the mix design	Natural or Artificial Pozzolans	Concrete for Jacking or Grouting	
Section 03924 Structural Concrete Repair and Sealing				
03924 2.1 B. 1. Repair Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 03932 Concrete Slope Protection Repair				
03932 2.1 A. Materials	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
03932 2.1 B. Materials	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 03933 Parapet/Parapet End Modification				
03933 2.1 A. Materials	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
03933 2.1 B. Materials	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
03933 3.4 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 03934 Structural Pothole Patching				
03934 2.1 A. Materials	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 05831 Expansion Joint Modification				
05831 2.1 A. Portland Cement Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
05831 2.1 B. Cement	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
05831 3.5 B. Place Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 05835 Modular Expansion Joint				
05835 2.1 A. Portland Cement concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
05835 2.1 B. Cement	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
05835 3.8 B. Place Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 07921 Sealing Existing Concrete Slope Protection Joints				
07921 2.1 C. 1. Portland Cement Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
07921 2.1 D. Cement	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 13552 Ramp Meter Signals and Signing				
13552 2.1 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 13553 ATMS Conduit				
13553 2.1 H. 1. Backfill	Allows the use of fly ash and pozzolans to be used as a flowable fill	Fly Ash, Pozzolans	Flowable Fill	Meet Requirements of Section 03575
13553 2.1 H. 2. Backfill	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
13553 3.3 A. 6. Trench	Allows hot mix asphalt to contain reclaimed asphalt pavement, crushed slag, stone or gravel in the aggregate mix	Crushed Slag, Reclaimed Asphalt Pavement	Hot Mix Asphalt	Meet Requirements of Section 02741
Section 13554 Polymer Concrete Junction Box				
13554 2.1 A. Fill	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
13554 2.1 B. Fill	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
13554 2.1 C. Fill	Allows the use of fly ash and pozzolans to be used as a flowable fill	Fly Ash, Pozzolans	Flowable Fill	Meet Requirements of Section 03575
13554 2.7 A. Concrete Collar	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
13554 3.3 B. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 13555 ATMS Cabinet				
13555 2.2 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
13555 3.2 C. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 13556 Closed Circuit Television (CCTV) Assembly				
13556 2.2 A. CCTV Steel Pole Foundation	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
13556 3.2 F. CCTV Pole Foundation	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
Section 13592 Roadway Weather Information System – Environmental Sensor Station (RWIS-ESS)				
13592 2.2 A. Remote Processing Unit (RPU) Tower Foundation and Service Pad	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
13592 2.2 B. Remote Processing Unit (RPU) Tower Foundation and Service Pad	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
13592 3.2 A. RPI Tower Foundation and Service Pad	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
13592 3.2 B. RPI Tower Foundation and Service Pad	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 16135 Electrical Junction Boxes				
16135 2.5 A. Backfill	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
16135 2.5 B. Backfill	Allows fly ash, pozzolans, and recycled Portland cement concrete to be used as a backfill	Fly Ash, Pozzolans, Recycled Portland Cement Concrete	Backfill	Meet Requirements of Section 02056
Section 16525 Highway Lighting				

Utah DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
16525 2.6 F. 1. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
16525 2.16 A. Concrete	Allows fly ash, natural pozzolans, and silica fume to be used in Portland cement concrete	Fly Ash, Silica Fume, Natural Pozzolans	Portland Cement Concrete	Meet Requirements of Section 03055
16525 2.16 B. Hot Mix Asphalt	Allows hot mix asphalt to contain reclaimed asphalt pavement, crushed slag, stone or gravel in the aggregate mix	Crushed Slag, Reclaimed Asphalt Pavement	Hot Mix Asphalt	Meet Requirements of Section 02741
16525 2.16 C. Flowable Fill	Allows the use of fly ash and pozzolans to be used as a flowable fill	Fly Ash, Pozzolans	Flowable Fill	Meet Requirements of Section 03575
References:				
http://www.dot.state.ut.us/main/uconowner.gf?n=535070920228586915				
http://www.dot.state.ut.us/main/f?p=100:pg:0:::1:T,V:1927,				
http://fhwapap04.fhwa.dot.gov/nhswp/browseStandardSpecs.jsp				
Edition Year 2008				

Table 10. Wyoming Department of Transportation Standard Specifications

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 202 Removal				
202.4.5 (3) Surfacing, Subgrade, and Miscellaneous Materials	Allows the reuse of removed materials			
Section 203 Excavation and Embankment				
203.4.1 (7) Construction-General	Allows unsuitable materials to be incorporated into other portions of the work		Excavation, Embankment	
Section 206 Excavation and Backfill for Culverts				
206.2 Materials	Allows the use of fly ash in excavation or backfill	Fly Ash	Excavation, Backfill	Meet Requirements of Section 801.2
206.2 Materials	Allows the use of different aggregates to be used in flowable fill	Manufactured Sand, Crushed Aggregate, Reclaimed Asphalt	Aggregate for Flowable Fill	Meet Requirements of Section 803
206.4.2 Disposal of Excavated Materials	Allows the materials to be stockpiled for backfill, incorporated into other projects, or transported for embankment if approved by the engineer		Backfill, Embankment	
206.4.5.2 Flowable Backfill	Allows fly ash to be incorporated in the flowable fill	Fly Ash	Flowable Fill	
Section 212 Structure Excavation and Backfill				
212.2 Materials	Allows crushed gravel, rocks and manufactured sands to be used in the backfill aggregate	Manufactured Sand	Backfill	Meet Requirements of Subsection 803.14
Section 310 Stockpiled Aggregate				

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
310.2 Materials	Allows the use of different materials for aggregates	Manufactured Sand, Crushed Aggregate, Reclaimed Asphalt	Aggregate	Meet Requirements of Section 803
Section 401 Plant Mix Pavements and Recycled Plant Mix Pavements				
401.1 Description	Requirements for construction of one or more courses of plant mix pavement or recycled plant mix pavement placed on a prepared foundation	Recycled Pavement	Pavement	
401.2.2 Aggregates	Allows the use of different materials for aggregates	Manufactured Sand, Crushed Aggregate, Reclaimed Asphalt	Aggregate	Meet Requirements of Section 803
401.2.2.1 Recycled Plant Mix Pavement	Allows aggregates for recycled plant mix pavement	Reclaimed Asphalt Pavement	Recycled Pavements	Meet Requirements of Section 803
401.4.13.2 (4) Job Mix Formula	Use reclaimed asphalt pavement (RAP) for at least 10% of the total aggregate	Reclaimed Asphalt Pavement	Recycled Pavements	
401.4.13.3.1 General	Allows for reclaimed asphalt pavement (RAP) when specified	Reclaimed Asphalt Pavement	Recycled Pavements	
401.4.14 Cold Milling Plant Mix Pavement	Allows removal and stockpiling of RAP as a source in mixes	Reclaimed Asphalt Pavement	Recycled Pavements	Meet Requirements of Subsection 202.4.5(2)
Section 403 Plant Mix Pavement Crack Sealing				
403.2 Materials	Allows fly ash to be used as a blotter material	Fly Ash	Blotter Material	
Section 404 Plant Mix Wearing Course				
404.2 Materials	Allows for recycled agents to be used in emulsified asphalts	Recycled Agents	Emulsified Asphalt	Meet Requirements of Subsection 804.3

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
404.4.1 General	Requirements for construction of one or more courses of plant mix pavement or recycled plant mix pavement placed on a prepared foundation	Recycled Plant Mix Pavements	Pavement	Meet Requirements of Section 401
Section 407 Tack Coat				
407.2 Materials	Allows for recycled agents to be used in emulsified asphalts	Recycled Agents	Emulsified Asphalt	Meet Requirements of Subsection 804.3
Section 409 Chip and Fog Seals				
409.2 Materials	Allows for recycled agents to be used in emulsified asphalts	Recycled Agents	Emulsified Asphalt	Meet Requirements of Subsection 804.3
Section 410 Microsurfacing				
410.2 Materials	Allows fly ash to be used in the cement	Fly Ash	Cement	Meet Requirements of Section 801
Section 412 Plant Mix Surface Appurtenances				
412.2 Materials	Allows aggregates made with fly ash for plant mix surface appurtenances	Fly Ash	Aggregate	Meet Requirements of Section 803
412.2 Materials	Allows for recycled agents to be used in emulsified asphalts	Recycled Agents	Emulsified Asphalt	Meet Requirements of Subsection 804.3
Section 415 Concrete Pavement Repair				
415.2.1 Materials - Slab Replacement	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete Pavement, Aggregate	Meet Requirements of Section 803

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
				and 801.2
415.4.2.3 (2) Replacement Procedures	Up to 95% density of existing material can be used for excavation and backfill		Excavation, Backfill	Meet Requirements of Section 513 AASHTO T 99
Section 502 Precast Concrete				
502.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
Section 504 Bearing Piles and Sheet Piling				
504.4.6.2.4 Weld Splices	Splice together cut-offs and incorporate them into the structure to reduce piling waste			
Section 505 Concrete Barrier				
505.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
Section 506 Drilled Shaft Foundations				
506.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
506.4.4 Concrete	Class S concrete contains fly ash	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 507 Reinforced Bridge Approach Fills and Reinforced Concrete Approach Slabs				
507.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
507.4.3 Reinforced Concrete Approach Slabs	Class B concrete for the mix design contains fly ash	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
Section 508 Reinforced Concrete Slope Paving				
508.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate, Backfill	Meet Requirements of Section 803 and 801.2
508.4.2 Placing, Finishing, and Curing Concrete	Class B concrete for the mix design contains fly ash	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
Section 511 Riprap and Gabion Erosion Protection				
511.2 Materials	Aggregate for riprap contains reclaimed asphalt pavement	Reclaimed Asphalt Pavement	Riprap	Meet Requirements of Section 803
Section 513 Structural Concrete				
513.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
513.4.4 (6) Mix Design	Allows fly ash to substitute Portland cement up to 20% by weight at a 1:1 replacement ratio	Fly Ash	Concrete	Must be approved by the materials

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
				program
513.4.8 (1) Cement and Fly Ash	Fly ash is used as a material in the batch mix	Fly Ash	Concrete	Meet Requirements of Subsection 109.1.4
Section 515 Silica Fume Modified Concrete Bridge Deck Repair				
515.2 Materials	Allows aggregate made with fly ash to be used in the concrete	Fly Ash	Concrete	Meet Requirements of Section 803
515.4.2 Mix Design	Allows the use of silica fume-modified concrete	Silica Fume	Silica Fume-Modified Concrete	Meet Requirements of Table 515.4.2-1
Section 603 Culverts and Storm Drains				
603.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate, Backfill	Meet Requirements of Section 803 and 801.2
603.4.7 Pipe Collars	Class B concrete for the mix design contains fly ash	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
603.4.9 Backfilling	Allows fly ash to be incorporated in the flowable fill	Fly Ash	Backfill	Meet Requirements of 206.4.5
Section 605 Underdrains				
605.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
				and 801.2
605.4.3 (3) Underdrain Outlets	Allows fly ash to substitute Portland cement up to 20% by weight at a 1:1 replacement ratio	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
605.4.4 Trench Backfill	Allows fly ash to be incorporated in the flowable fill	Fly Ash	Backfill	Meet Requirements of 206.4.5
Section 606 Guardrail and Median Barrier				
606.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
606.4.3.4 End Anchorages	Class B concrete for the mix design contains fly ash	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
Section 607 Fences				
607.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
607.4.1 General	Allows fly ash to substitute Portland cement up to 20% by weight at a 1:1 replacement ratio	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
Section 608 Minor Concrete Paving				
608.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
				of Section 803 and 801.2
608.4.1.1 Construction-Placing Concrete	Class B concrete for the mix design contains fly ash	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
Section 609 Curb and Gutter				
609.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
609.4.2.1 Placing Concrete - General	Allows fly ash to substitute Portland cement up to 20% by weight at a 1:1 replacement ratio	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
Section 610 Metal Drain Inlets				
610.4 (3) Construction	Allows fly ash to be incorporated in the flowable fill	Fly Ash	Backfill	Meet Requirements of Subsection 206.4.5
Section 611 Highway Monuments				
611.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
611.4.2 Fabrication	Class B concrete for the mix design contains fly ash	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
Section 612 Siphons				

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
612.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
612.4.4 Couplings	Allows fly ash to substitute Portland cement up to 20% by weight at a 1:1 replacement ratio	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
612.4.6 (1) Inlet and Outlet Structures and Drain Boxes	Allows fly ash to substitute Portland cement up to 20% by weight at a 1:1 replacement ratio	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
612.4.7 Backfill	Allows fly ash to be incorporated in the flowable fill	Fly Ash	Backfill	Meet Requirements of Subsection 206.4.5
Section 614 Erosion Control Concrete				
614.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
614.4.1 (2) General	Allows fly ash to substitute Portland cement up to 20% by weight at a 1:1 replacement ratio	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
Section 615 Cattle Guards				
615.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
615.4.3 Foundations	Allows fly ash to substitute Portland cement up to 20% by weight at a 1:1 replacement ratio	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
Section 617 Cut-Off Walls and Head Walls				
617.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
617.4 Construction	Allows fly ash to substitute Portland cement up to 20% by weight at a 1:1 replacement ratio	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
Section 618 Precast Reinforced Concrete Stock Passes				
618.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
618.4 Construction	Allows fly ash to be incorporated in the flowable fill	Fly Ash	Backfill	Meet Requirements of Subsection 206.4.5
Section 620 Adjustment of Valve Boxes and Fire Hydrants				
620.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
620.4.4 Thrust Blocks	Allows fly ash to substitute Portland cement up to 20% by weight at a 1:1 replacement ratio	Fly Ash	Concrete	Meet Requirements of Subsection

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
				513.4.4
620.4.5 Backfilling	Allows fly ash to be incorporated in the flowable fill	Fly Ash	Backfill	Meet Requirements of Subsection 206.4.5
Section 622 Structural Plate Pipe				
622.2 Materials	Class B bedding is made with aggregate that contains fly ash	Fly Ash	Concrete	Meet Requirements of Section 803
622.4.6 Backfilling	Allows fly ash to be incorporated in the flowable fill	Fly Ash	Backfill	Meet Requirements of Subsection 206.4.5
Section 625 Manholes, Inlets, Catch Basins, and Diversion Boxes				
625.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
625.4.1 (3) General	Allows fly ash to be incorporated in the flowable fill	Fly Ash	Backfill	Meet Requirements of Section 206
625.4.1 (6) General	Allows fly ash to substitute Portland cement up to 20% by weight at a 1:1 replacement ratio	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
Section 631 Slotted Drains				
631.2 Materials	Allows fly ash and aggregate in Class B bedding to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
				and 801.2
631.4.2 (3) Installation	Allows fly ash to substitute Portland cement up to 20% by weight at a 1:1 replacement ratio	Fly Ash	Concrete	Meet Requirements of Subsection 513.4.4
631.4.2 (4) Installation	Allows concrete or other approved materials for bedding material in the construction of pipe beds			Meet Requirements of Section 803
Section 701 Electrical Devices				
701.2 Materials	Allows fly ash and aggregate to be used for the concrete	Fly Ash	Concrete, Aggregate	Meet Requirements of Section 803 and 801.2
Section 801 Cement and Admixtures				
801.1 Portland Cement	Allows for use of foundry sands and industrial materials for Portland cement concrete	Foundry Sands and Industrial Materials	Portland Cement	ASTM C 150
801.2 Fly Ash	Allows the use of fly ash in materials based on approval that is based on the test results	Fly Ash	Portland Cement	ASTM C 311 ASTM C 618
801.3 Blended-Hydraulic Cement	Allows the use of pozzolan in Portland cement. Fly ash can also be used in Portland cement.	Pozzolan Modified Portland Cement, Fly Ash	Portland Cement	ASTM C 595 ASTM C 311 ASTM C 618 Meet Requirements of Subsection 801.1
801.4.3 Silica Fume Admixture	Allows the use of silica fume	Silica Fume	Portland Cement Admixtures	AASHTO M 307
Section 803 Aggregate				

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
803.1 General	Crushed aggregate can be used for subbases, bases, or plant mix pavements	Crushed aggregate	Aggregate	
803.3 Aggregate for Mortar	Allows use of slag for mortar	Slag	Aggregate	AASHTO M 45
803.5.3 Reclaimed Asphalt Pavement	Crush and screen reclaimed asphalt pavement (RAP) greater than 2 inches [50 mm] so all material is prepared for recycling and a uniform mixture is maintained.	Reclaimed Asphalt Pavement	Aggregate	
803.5.5 Gradation and Properties	Allows reclaimed asphalt pavement to be used in mixture	Reclaimed Asphalt Pavement	Aggregate	
803.10 Aggregate for Bed Course Material	Aggregate can be made with sand, gravel, crushed stone, or other approved materials	Other Approved Materials	Aggregate	
803.12 Gravel for Drains	Aggregate can be made with crushed or natural sand, gravel, or other approved free draining materials	Other Approved Materials	Aggregate	
803.15.1 Aggregate for Riprap - General	Allows broken concrete, or crushed stone to be used in aggregate	Broken Concrete	Aggregate	
Section 804 Asphalt Materials				
804.3 Emulsified Asphalt	Allows for recycled agents to be used in emulsified asphalts	Recycled Agents	Asphalt	AASHTO R 14 ASTM D 4552 ASTM D 5505
Section 807 Joint Materials				
807.2 Hot-Poured Elastic Sealant	Recycled rubber and fillers can be blended into sealant mixture	Recycled Rubber	Sealant Mixture	AASHTO M 173 AASHTO M 301 Meet Requirements of Table 807.2-1
Section 808 Pipe				

Wyoming DOT - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
808.1.3 Reinforced Concrete Pipe, Type V Cement with Fly Ash	Allows the use of 20% to 30% fly ash by weight	Fly Ash	Concrete	Meet Requirements of Subsection 801.2
Section 812 Fence and Cattle Guards				
812.8.3.1 Recycled Plastics	Allows fence posts to be made from Recycled Plastic, Post-Consumer Material, and/or Recovered Materials	Recycled Plastic, Post-Consumer Material, Recovered Materials	Fence Posts	
Section 819 Grout				
819.1.1 Sand-Cement Grout	Use grout made of Portland cement and sand made from mortar aggregate to produce sand-cement grout	Foundry Sands, Slag, Industrial Materials	Portland Cement, Mortar Aggregate	Meet Requirements of Subsections 801.1 and 803.3
References:				
http://fhwapap04.fhwa.dot.gov/nhswp/reader?agency=Wyoming&fn=Wyoming+Standard+Specifications.pdf&type=standard				
http://www.dot.state.wy.us/webdav/site/wydot/shared/Construction/2003%20Spec%20Book/Standard_Specifications_for_Road_and_Bridge_Construction.pdf				
http://fhwapap04.fhwa.dot.gov/nhswp/browseStandardSpecs.jsp				
Edition Year 2003				

Table 11. Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects

FHWA - Section Title and Name	Reuse/Recycling Description	Recycled Materials	Applications	Other Requirements
Section 201 Clearing and Grubbing				
201.07 Acceptance	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Backfill	Meet Requirements of Section 209
Section 203 Removal of Structures and Obstructions				
203.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
203.05 Disposing of Material	Contractors urged to use recycled materials where practical			
203.06 Acceptance	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Backfill	Meet Requirements of Section 209
Section 204 Excavation and Embankment				
204.07 Sub Excavation	Use of suitable materials in the backfill of sub excavation		Backfill	
204.08 Borrow Excavation	Use all roadway excavation in embankment construction		Embankment	
204.10 Embankment Construction	Allows use of suitable roadway excavation materials		Embankment	
Section 208 Structure Excavation and Backfill for Selected Major Structures				
208.02 Materials	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete, Seal Concrete, Backfill	Meet Requirements of Section 552
208.04 General	Allows use of suitable materials for structural backfill		Backfill	
208.07 Foundation Seal	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete Mix Design	Meet Requirements of

				Subsection 552.03
Section 209 Structural Excavation and Backfill				
209.02 Materials	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Backfill, Concrete	Meet Requirements of Section 552 and 601
Section 210 Permeable Backfill				
210.02 Materials	Allows slag or crushed stone to be used in permeable backfill	Slag	Backfill	Meet Requirements of Subsection 703.04
210.04 Acceptance	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Backfill	Meet Requirements of Section 208
Section 213 Subgrade Stabilization				
213.02 Materials	Allows the processing and incorporation of fly ash in the upper layer of a subgrade	Fly Ash	Subgrade	Meet Requirements of Subsection 725.04
213.03 Proportioning	Allows the use of fly ash in the mix design	Fly Ash	Subgrade	
213.09 Acceptance	Fly ash evaluations for the use in Section 213	Fly Ash		Meet Requirements of Subsections 106.02 and 106.03
Section 251 Riprap				
251.02 Materials	Allows fly ash to be used in the mortar	Fly Ash	Mortar	Meet Requirements of Subsection 712.05
Section 253 Gabions and Revet Mattresses				

253.02 Materials	Allows slag or crushed stone to be used in permeable backfill	Slag	Backfill	Meet Requirements of Subsection 703.04
253.09 Acceptance	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Backfill	Meet Requirements of Section 209
Section 254 Crib Walls				
254.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
254.06 Acceptance	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Backfill, Structural Backfill, Bed Course Material	Meet Requirements of Section 209
Section 255 Mechanically Stabilized Earth Walls				
255.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete Leveling Pad	Meet Requirements of Section 601
255.03 General	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Backfill	Meet Requirements of Section 209
Section 257 Alternative Retaining Walls				
257.02 Materials	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete Retaining Walls	Meet Requirements of Sections 552, 254, and 258
Section 258 Reinforced Concrete Retaining Walls				
258.02 Materials	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete Retaining Walls	Meet Requirements of Section 552
258.05 Structural Concrete	Allows the use of fly ash, blast furnace slag, and silica fume	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete	Meet Requirements of Subsection

				552.03
258.07 Acceptance	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Backfill	Meet Requirements of Section 209
Section 302 Treated Aggregate Courses				
302.02 Materials	Allows the use of fly ash in aggregate	Fly Ash	Aggregate	Meet Requirements of Subsection 725.04
302.02 Materials	Allows slag to be part of the aggregate	Slag	Aggregate	Meet Requirements of Section 703.05
Section 304 Aggregate Stabilization				
304.02 Materials	Allows the use of fly ash in aggregate	Fly Ash	Aggregate	Meet Requirements of Subsection 725.04
Section 307 Stockpiled Aggregates				
307.02 Materials	Allows slag to be apart of the aggregate	Slag	Aggregate	Meet Requirements of Section 703
Section 308 Minor Crushed Aggregate				
308.06 Acceptance	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Backfill Aggregate	Meet Requirements of Section 209
Section 401 Hot Asphalt Concrete Pavement				
401.01 Description	Allows the use of fly ash	Fly Ash	Antistrip Additive	Meet Requirements of Subsection 702.08

401.02 Materials	Allows slag to be part of the aggregate	Slag	Aggregate A, B, C or Superpave Mix	Meet Requirements of Subsections 703.07 and 703.17
401.03 Composition of Mix (Job-Mix Formula)	Allows the use of recyclable materials for all surfaces except the final surface course	Recyclable Materials	Hot Asphalt Concrete	Meet Requirements of Section 403
401.04 (a) 2 Dust Collector	Use of baghouse fines in asphalt concrete mixes requires approval unless included as part of the approved job-mix formula	Baghouse Fines	Asphalt Concrete Mix	AASHTO M 156
Section 402 Minor Hot Asphalt Concrete				
402.02 Composition of Mix (Job-Mix Formula)	Hot asphalt concrete mix can contain crushed stone or gravel, and/or asphalt cement	Asphalt Cement	Hot Asphalt Concrete	
Section 403 Hot Recycled Asphalt Concrete Pavement				
403.01 Description	Allows reclaimed asphalt pavement material and/or reclaimed aggregate material combined with new aggregate, asphalt cement, and/or recycling agents.	Reclaimed Asphalt Pavement, Reclaimed Aggregate, Asphalt Cement, Recycling Agents	Hot Recycled Asphalt Concrete Pavement	
403.02 Materials	Allows use of recycling agents	Recycling Agent		Meet Requirements of Subsection 702.06
403.02 Materials	Allows slag to be part of the aggregate	Slag	Aggregate	Meet Requirements of Subsection 703.07
403.02 Materials	Allows the use of fly ash	Fly Ash	Antistrip Additive	Meet Requirements of Subsection 702.08

403.03 Composition of Mix (Job-Mix Formula)	Allows use of reclaimed aggregate material, reclaimed asphalt pavement material, asphalt cement, recycling agent, and additives that meet the applicable aggregate gradation requirements in the mix	Reclaimed Aggregate, Reclaimed Asphalt Pavement, Asphalt Cement, Recycling Agent	Hot Recycled Asphalt Concrete Pavement	
403.03 (a) Composition of Mix (Job-Mix Formula)	Allows samples of reclaimed asphalt pavement material, reclaimed aggregate material, and recycling agents to be incorporated in the work	Reclaimed Asphalt Pavement, Reclaimed Aggregate, Recycling Agents	Hot Recycled Asphalt Concrete Pavement	
Section 404 Open-Graded Asphalt Friction Course				
404.02 Materials	Allows the use of fly ash	Fly Ash	Antistrip Additive	Meet Requirements of Subsection 702.08
Section 405 Hot Asphalt Treated Base Course				
405.02 Materials	Allows the use of fly ash	Fly Ash	Antistrip Additive	Meet Requirements of Subsection 702.08
Section 406 Dense-Graded Emulsified Asphalt Pavement				
406.02 Materials	Allows slag to be part of the aggregate	Slag	Aggregate	Meet Requirements of Subsection 703.09
Section 407 Open-Graded Emulsified Asphalt Pavement				
407.02 Materials	Allows slag to be part of the aggregate	Slag	Aggregate	Meet Requirements of Subsection 703.09
Section 408 Cold Recycled Asphalt Base Course				

408.01 Description	Constructing one or more courses of cold recycled asphalt base	Reclaimed Asphalt Pavement, Recycling Agents, Reclaimed Aggregate	Cold Recycled Asphalt Base Course	Meet Requirements of Table 703-5
408.02 Materials	Allows use of recycling agents	Recycling Agent		Meet Requirements of Subsection 702.06
408.03 Composition of Mix (Job-Mix Formula)	Mixture of reclaimed aggregate material, reclaimed asphalt pavement material, new aggregate, water, emulsified asphalt, recycling agent, and/or lime that meets the applicable aggregate gradation	Reclaimed Asphalt Pavement, Recycling Agents, Reclaimed Aggregate		
Section 409 Asphalt Surface Treatment				
409.02 Materials	Allows slag to be part of the aggregate	Slag	Aggregate	Meet Requirements of Subsection 703.10
Section 410 Slurry Seal				
410.02 Materials	Allows slag to be part of the aggregate	Slag	Aggregate	Meet Requirements of Subsection 703.11
Section 416 Continuous Cold Recycled Asphalt Base Course				
416.01 Description	Constructing a recycled asphalt base course using methods and equipment capable of recycling and relaying the material in a one pass operation		Recycled Asphalt Base Course	AASHTO M 140 AASHTO M 208
416.02 Materials	Allows use of recycling agents	Recycling Agent		Meet Requirements of 702.06
Section 501 Portland Cement Concrete Pavement				

501.02 Materials	Allows the use of fly ash in Portland cement and grout	Fly Ash	Portland Cement Concrete Pavement, Grout	Meet Requirements of Subsections 725.04 and 725.22
Section 502 Portland Cement Concrete Pavement Restoration				
502.03 Composition of Mix (Concrete Mix Design)	Allows the use of fly ash in the grout	Fly Ash	Portland Cement Concrete Pavement, Grout	Meet Requirements of Subsection 725.22
502.10 Fracturing Concrete Pavement	When broken concrete is removed, it is filled with asphalt concrete	Asphalt Cement		Meet Requirements of Section 402
Section 551 Driven Piles				
551.02 Materials	Concrete is used for construction purposes	Blast Furnace Slag, Fly Ash, Silica Fume	Structural Concrete	Meet Requirements of Section 552
551.14 (b) Concrete	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete	Meet Requirements of Section 552
Section 552 Structural Concrete				
552.02 Materials	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete	Meet Requirements of Subsection 725.04
552.03 (g) 1 Fly Ash	Fly ash may partially replace cement in any mix design except for prestressed concrete	Fly Ash	Concrete	
552.03 (g) 2 Ground Iron Blast Furnace Slag	Blast furnace slag may partially replace cement in any mix design except for prestressed concrete	Blast Furnace Slag	Concrete	
552.03 (g) 3 Silica Fume	Silica fume may partially replace cement in any mix design except for prestressed concrete	Silica Fume	Concrete	
Section 553 Prestressed Concrete				

553.02 Materials	Allows the use of fly ash, blast furnace slag and silica fume in the concrete and fly ash in the grout	Blast Furnace Slag, Fly Ash, Silica Fume	Portland Cement Concrete Pavement, Grout	Meet Requirements of Subsection 725.22 and Section 552
553.05 Concrete	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete	Meet Requirements of Section 552
Section 556 Bridge Railing				
556.02 Materials	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete	Meet Requirements of Section 552
Section 565 Drilled Shafts				
565.02 Materials	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete	Meet Requirements of Section 552
565.07 Concrete for Drilled Shafts	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete	Meet Requirements of Section 552
Section 601 Minor Concrete Structures				
601.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Subsection 725.04
601.03 (f) Concrete Composition	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete	Meet Requirements of Subsection 552.03 (g)
601.04 General	Contains information for designing and constructing forms	Fly Ash, Pozzolan	Concrete	
Section 602 Culverts and Drains				
602.02 Materials	Allows fly ash to substitute for 2 of the 3 parts Portland cement	Fly Ash	Grout Backfill	Meet Requirements of

				Subsection 704.11
Section 604 Manholes, Inlets and Catch Basins				
604.02 Materials	Allows the use of fly ash in grout and concrete for cast-in-place units	Fly Ash	Concrete, Grout	Meet Requirements of Section 601and Subsection 725.22
604.04 Concrete Construction	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
604.05 Masonry Block Construction	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
604.08 Acceptance	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete	Meet Requirements of Section 601
Section 608 Paved Waterways				
608.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
608.02 Materials	Allows fly ash to be used in the cement that makes the mortar	Fly Ash	Mortar	Meet Requirements of Subsection 712.05
608.10 Acceptance	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
608.10 Acceptance	Hot asphalt concrete mix can contain crushed stone or gravel, and/or asphalt cement	Asphalt Cement	Hot Asphalt Concrete	Meet Requirements of Section 402
Section 609 Curb and Gutter				

609.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
609.02 Materials	Allows fly ash to be used in the cement that makes the mortar	Fly Ash	Mortar	Meet Requirements of Subsection 712.05
609.02 Materials	Hot asphalt concrete mix can contain crushed stone or gravel, and/or asphalt cement	Asphalt Cement	Hot Asphalt Concrete	Meet Requirements of Section 402
Section 611 Water Systems				
611.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
Section 612 Sanitary Sewer System				
612.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
Section 613 Simulated Stone Masonry Surface				
613.02 Material	Allows the use of fly ash in grout	Fly Ash	Plaster Mix (Grout)	Meet Requirements of Subsection 725.22
Section 614 Lean Concrete Backfill				
614.02 Material	Allows the use of industrial materials for lean concrete backfill	Fly Ash, Portland Blast-Furnace Slag Cement, Portland-Pozzolan Cement, Slag Modified Portland Cement, Slag Cement	Backfill	Meet Requirements of Section 701.01
Section 615 Sidewalks, Drive Pads and Paved Medians				
615.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601

615.02 Materials	When broken concrete is removed, it is filled with asphalt concrete		Asphalt Concrete	Meet Requirements of Section 402
Section 616 Slope Paving				
616.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
616.02 Materials	Allows fly ash to be used in the cement that makes the mortar	Fly Ash	Mortar	Meet Requirements of Subsection 712.05
Section 617 Guardrail				
617.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
Section 618 Concrete Barriers and Precast Guard Walls				
618.02 Materials	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete	Meet Requirements of Section 552
Section 619 Fences, Gates and Cattle Guards				
619.02 Materials	Allows the use of fly ash in grout and concrete	Fly Ash	Concrete, Grout	Meet Requirements of Section 601
619.02 Materials	Allows the use of fly ash in grout and concrete for cast-in-place units	Fly Ash	Concrete, Grout	Meet Requirements of Subsection 725.22 (e)
619.07 (b) Concrete Foundation	Allows the use of fly ash in concrete construction for cattle guards (cast-in-place or precast)	Fly Ash	Concrete	Meet Requirements of Section 601
Section 620 Stone Masonry				
620.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of

				Section 601
620.02 Materials	Allows fly ash to be used in the cement that makes the mortar	Fly Ash	Mortar	Meet Requirements of Subsection 712.05
Section 621 Monuments and Markers				
621.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
621.03 Monuments and Markers	Monuments may be cast-in-place or precast	Fly Ash	Concrete	Meet Requirements of Section 601
Section 633 Permanent Traffic Control				
633.02 Materials	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
633.04 Supports	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Backfill	Meet Requirements of Section 209
Section 636 Signal, Lighting and Electrical Systems				
636.04 General	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
636.04 Supports	Allows the construction of concrete footings for traffic control signs that contain fly ash	Fly Ash	Concrete	Meet Requirements of Section 601
Section 701 Hydraulic Cement				

701.01 Portland Cement and Masonry Cement	Allows the use of industrial materials	Fly Ash, Portland Blast-Furnace Slag Cement, Portland-Pozzolan Cement, Slag Modified Portland Cement, Slag Cement	Hydraulic Cement	AASHTO M 85 AASHTO M 240 ASTM C 91
Section 702 Asphalt Material				
702.05 (d) Mortars	Allows fly ash to be used in the cement that makes the mortar	Fly Ash	Mortar	Meet Requirements of Subsection 712.05
702.08 (b) Antistrip Additive Type 2	Allows the use of fly ash	Fly Ash		Meet Requirements of Subsections 701.01 and 725.04
Section 703 Aggregate				
703.04 Permeable Backfill	Allows slag to be part of the aggregate	Slag	Aggregate	AASHTO T 11 AASHTO T 27
703.05 Subbase, Base, and Surface Course Aggregate	Allows slag to be part of the aggregate	Slag	Aggregate	AASHTO T 96 AASHTO T 104 AASHTO T 210
703.07 (a) Coarse aggregate	Allows slag to be part of the aggregate	Slag	Aggregate	AASHTO T 96 AASHTO T 104 AASHTO T 210
703.07 (b) Fine aggregate	Allows slag to be part of the aggregate	Slag	Aggregate	AASHTO T 210 AASHTO T 176
703.07 (d) Lightweight aggregate (slag)	Allows slag to be part of the aggregate	Slag	Aggregate	AASHTO M 195
703.09 (a) Coarse aggregate	Allows slag to be part of the aggregate	Slag	Aggregate	AASHTO T 96 AASHTO T 104 AASHTO T 210

703.09 (b) Fine aggregate	Allows slag to be part of the aggregate	Slag	Aggregate	AASHTO T 210 AASHTO T 176
703.10 Asphalt Surface Treatment Aggregate	Allows slag to be part of the aggregate	Slag	Aggregate	AASHTO T 96 AASHTO T 104 AASHTO T 19M AASHTO T 182 AASHTO T 210 AASHTO T 112
703.11 Slurry Seal Aggregate	Allows slag to be part of the aggregate	Slag	Aggregate	AASHTO M 29 AASHTO T 96 AASHTO T 176
703.17 Superpave Asphalt Concrete Pavement Aggregate	Allows slag to be part of the aggregate	Slag	Aggregate	AASHTO T 96 AASHTO TP 33 ASTM D 4791 AASHTO T 176 AASHTO T 11 AASHTO T 27
Section 704 Soil				
704.11 Special Grout Backfill	Allows fly ash to substitute for 2 of the 3 parts Portland cement	Fly Ash	Grout Backfill	AASHTO M 295
Section 710 Fence and Guardrail				
710.04 (b) Fence Post	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
Section 712 Joint Material				
712.05 (a) Materials	Allows fly ash to be used in the cement that makes the mortar	Fly Ash	Mortar	Meet Requirements of Subsection 725.04
712.05 (b) Composition	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete	Meet Requirements of Section 552
Section 713 Roadside Improvement Material				

713.02 Agricultural Limestone	Granulated slag or other approved natural sources of lime may be used	Granulated Slag	Limestone	
Section 715 Piling				
715.03 Concrete Piles	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete	Meet Requirements of Section 552
Section 720 Structural Wall and Stabilized Embankment Material				
720.01 (a) Concrete Face Panels	Allows the use of fly ash, blast furnace slag and silica fume in the concrete	Blast Furnace Slag, Fly Ash, Silica Fume	Concrete	Meet Requirements of Section 552
Section 722 Anchor Material				
722.02 (e) Grout	Allows the use of fly ash in grout and concrete for cast-in-place units	Fly Ash	Concrete, Grout	Meet Requirements of Subsection 725.22 (e)
Section 725 Miscellaneous Material				
725.04 Pozzolans	Pozzolans can be fly ash, ground iron blast-furnace slag, and/or silica fume	Fly Ash, Ground Iron Blast-Furnace Slag, Silica Fume	Pozzolans	AASHTO M 295 AASHTO M 302 AASHTO M 307
725.05 Mineral Filler	Allows industrial materials to be used	Slag Dust, Hydraulic Cement, Fly Ash	Mineral Filler	AASHTO M 17
725.06 Precast Concrete Curbing	Allows the use of fly ash in concrete	Fly Ash	Concrete	Meet Requirements of Section 601
725.22 (a) Hydraulic Cement Grout	Fly ash can be used for hydraulic cement grout	Fly Ash	Hydraulic Cement Grout	AASHTO T 106 ASTM C 939
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