

PART F – GLOSSARY

This glossary is intended to assist *Department* personnel in understanding the significance of some of the words and terms used most frequently on projects. In most instances, the definitions or explanations are given as they are used or known in our State, rather than the technical or universal meaning.

Words or phrases in the definitions that are shown in italics are defined elsewhere in this part of the Manual. For additional terms referring to specific material types, refer to the manual distributed by the association affiliated with that material.

AASHTO. Acronym for the American Association of State Highway and Transportation Officials.

Abrasion. A wearing, grinding, or rubbing away of *aggregate* surface by friction.

Absorbed asphalt. The amount of *asphalt* absorbed by the *aggregate* during the mixing process. The *absorbed asphalt* is calculated using the *specific gravity* of mixture characteristics in the following equation:

$$P_{ba} = 100 \left(\frac{G_{se} - G_{sb}}{G_{sb} G_{se}} \right) G_b$$

Where: P_{ba} = Percentage of *absorbed asphalt* by weight of *aggregate*;
 G_{se} = Effective *specific gravity* of *aggregate*;
 G_{sb} = Bulk *specific gravity* of *aggregate*; and
 G_b = *Specific gravity* of *asphalt cement*.

Absorbed water. All the water absorbed by an *aggregate* until it reaches the *saturated-surface dry (SSD)* condition. *Absorbed water* is usually expressed as the ratio of the weight of water absorbed by the *aggregate sample* to the dry weight of the *sample*:

METRIC:

$$\% \text{Absorbed Water} = \frac{\text{weight of water (kg)}}{\text{weight of dry aggregate (kg)}} \times 100$$

ENGLISH:

$$\% \text{Absorbed Water} = \frac{\text{weight of water (lbs)}}{\text{weight of dry aggregate (lbs)}} \times 100$$

Absorption. The process of absorbing. The measure of the amount of water that can be absorbed into the accessible pores of *aggregate* particles.

Abutment. A structure, usually made of *Portland cement concrete*, stone, or masonry, located at each end of a *bridge*, designed to withstand earth *pressures* as well as forces exerted by the *superstructure*.

Accelerator. A class of *admixtures* that, when added to a *batch* of *Portland cement concrete*, reduces the setting time, causing the *concrete* to develop strength more rapidly.

Acceptance program. A program defined in AASHTO R-9. It is a statistically based acceptance plan, based on sampling and testing to determine whether or not the quality of the product or material are acceptable in terms of the *specifications*.

Accredited laboratory. A material testing laboratory which is accredited by AASHTO based on the requirements in AASHTO R-18.

Acetylene torch. A device used to cut or weld metal. The torch consists of a nozzle having valves to control the flow of acetylene and oxygen gases and devices to combine the gases to produce a very hot flame.

Acidity. A chemical property of a solution that has a *pH* less than 7.

Adhesion. The force by which one substance clings to a substance of a different nature.

Admixture. A chemical, other than *cement*, water, or *aggregate*, added to a *batch* of fresh *concrete* in the mixer to alter any of the normal properties of the *concrete*.

Aggregate. Inert mineral material, such as *sand*, *gravels*, crushed stone, *slag*, or the combination thereof. *Aggregates* are defined as coarse or fine, based on their *gradations* and use.

Agitation. Continuous rotation of the *concrete* truck mixer during transport to ensure the mix is uniform and homogenous.

Air entrained concrete. *Concrete* containing a small percentage, usually 5% to 9% *entrained air* by volume, of minute, disconnected, uniformly distributed air bubbles that have been purposely entrained. The *entrained air* acts as a very elastic and stable non-reactive fine *aggregate* with a high lubricating value. The use of *entrained air* permits an appreciable lowering of the water-*cement* ratio required to produce the desired workability of the *concrete*. Entrained are also improves the resistance of *concrete* to the effects of repeated freezing and thawing. Air entrainment is obtained by the addition of an *air entraining agent* to the *Portland cement* during manufacture (air entraining *Portland cement*) or by the addition of an *admixture* at the *concrete* mixer.

Air entraining agent. An *admixture* for *concrete* used to produce *air entrained concrete*. It is a chemical that causes a *concrete* mix to have microscopic air bubbles throughout, usually for the purpose of improving resistance to freezing and thawing. As the water within the *concrete* freezes and expands, the resulting *pressure* can be absorbed by empty air *voids*, thus preventing a

build-up of damaging *pressure*. It also improves workability of the mix due to the lubricating effect of the air bubbles.

Alignment. The ground plan of a highway as seen from above and as shown on a map or drawing, also called horizontal *alignment*. The *profile* drawing is the vertical *alignment*.

Alkalinity. A chemical property of a solution having a *pH* greater than 7.

AMRL. Acronym for the *AASHTO* Materials Reference Laboratory.

Anchor bolts. Steel bolts set within masonry or *concrete* at a specified depth, with a threaded section exposed, for securing a part or portion of the structure such as a *beam* or *column*.

Anchor studs. Small steel *bars* or straps, usually with hooked ends, welded to the *expansion joints* used in a structure. After the *concrete* next to the joints has hardened, the anchor *bars* hold the joints firmly in place.

Angle of repose. The steepest slope angle at which a particular *soil* will lie without cascading down.

Approach slab. A section of the roadway that is built over the *backfill* of an *abutment*, and leads up to the *bridge* itself. It is intended to minimize the possibility of *settlement* of the roadway at the structure.

Arch. A structure with a curved under-surface that supports a highway over an opening. Structurally, an *arch* carries vertical loads while an *abutment* provides resistance to horizontal loads.

Arc-welding. Joining metal parts by fusion in which heat is supplied by an electric arc between two electrodes or between one electrode and the grounded part.

Asphalt. A dark brown to black *organic*, cementitious material that is solid, semi-solid, or liquid in consistency. *Asphalt* can occur in nature (native *asphalt*) or as a residue in the refining of petroleum (artificial *asphalt*). See *bitumen*.

Asphalt cement. A heavy *binder* used in the preparation of *asphalt* mixtures. It is designated by selecting a *Performance Grade (PG)* suitable for the type of construction. Synonymous with *bituminous cement*.

ASTM. American Society for Testing and Materials.

Auger. A type of drill used to obtain *soil samples* for *soil* investigation.

Backfill. (1) *noun*. That material used to replace an excavated area. (2) *verb*. To fill with *soil*, stone, or similar materials to a given grade.

Backwall. That portion of an *abutment* above the *bridge seat* that prevents the *backfill* from spilling onto the *bridge seat*. It also holds the end dam or expansion device in place.

Bar. A square or round rod. Flat steel up to six inches in width is also considered to be a *bar*.

Bar chair. See *chair*.

Bar schedule. A table of information on the reinforcing *bars* to be used in a structure. The information listed in the *bar schedule* includes the size, length, shape, and identification mark for of each type of *bar*.

Base course. The layer or layers of specified or selected material of designated thickness placed on a *subbase* to support a *surface course*.

Base plate. See *Sole plate*.

Batch. From a production perspective, an isolated quantity of material made with the same components and with the same process at a source such that homogeneity of material properties is expected.

Batch plant. A facility that collects and stores ingredients, combines the proportions, and dispenses the mix into the truck.

Batter. The inclination from the vertical of a *pile* or the face of a wall.

Beam. A horizontal member forming part of the frame of a structure. It rests on supports and is susceptible to transverse stress. *Beams* are defined based on how they are supported.

- (1) *Cantilever:* A *beam* that has one or both ends overhanging the support for the *beam*; or a *beam* that has one end firmly fixed and the other end unsupported.
- (2) *Continuous:* A *beam* that rests upon more than two supports.
- (3) *Fixed:* A *beam* that has both ends firmly secured.
- (4) *Simple:* a *beam* that is supported at each end.

Beam seat. The area of the *abutment* or *pier* upon which the *beam* rests.

Bearing area. The part of the top surface of a mass of *concrete*, such as a *pier*, *abutment*, or *footing*, on which a *bridge beam* is directly supported. The *bearing area* is sometimes referred to as the bearing seat.

Bearing pile. A *pile* driven to resist horizontal and vertical forces caused by bearing. *Bearing piles* rest on a hard stratum, usually of rock, that underlies the *soil* and transfers the load to this hard stratum.

Bearing plate. A steel plate used to distribute a load over a larger area.

Bent. A vertical framework usually consisting of a *beam* or cap supported by *columns* or *piles*.

Bias. An error, constant in direction, common to each set of values which cannot be averaged out.

Bill of Lading. A receipt listing goods being signed by the carrier.

Binder. A material used to promote the cohesion and uniform consistency of *aggregate* particles to prevent the entrance of moisture.

Bitumen. See *asphalt*.

Bituminous cement. See *asphalt cement*.

Bituminous concrete. See *hot mix asphalt*.

Bleeding. (1) The flow of water from freshly placed *concrete* when no outside force is applied. *Bleeding* usually occurs with non-air-entrained *concrete*. (2) Formation of a film on *asphalt* pavement surface due to upward movement of the *asphalt* in the mix.

Blended cement. A *Portland cement* which has interground *pozzolans* such as, *slag*, *fly ash*, or *silica fume*. Specifications are in AASHTO M-240.

Boring (Test boring). A subsurface investigation performed by augering or by a hollow stem *auger* and standard penetration testing that details the cross section of the *soil profile*. Consistency of *cohesive soils* and relative *density* of *cohesionless soil* are determined for design purposes. The *soil samples* obtained in the drilling operation are tested for physical, index, and engineering properties to facilitate in forming decisions on construction issues.

Borrow. *Soil* removed from a designated location, called a *borrow* pit, for the purpose of providing fill on a given area.

Borrow (common). *Borrow* that is not suitable for use as *select borrow* but is suitable for less critical uses. Common *borrow* is referred to in the *Specifications* as *Borrow* Type F.

Borrow (select). *Borrow* graded and tested to conform to designated specifications. A high quality granular *soil* used for *backfilling* structures, constructing roadway bases, and for other significant applications.

Box culvert. A rectangular reinforced *concrete* drainage structure.

Bridge deck. The part of a *bridge superstructure* that provides direct support for vehicular and pedestrian traffic.

Bridge lift. A layer of a coarse grained *soil* (usually 209 B) that is placed over an unsuitable weak *soil* (usually low strength *organic clay*). The use of *bridge lifts* is a form of *soil stabilization*.

Bridge seat. The surface of an *abutment* or *pier* upon which the *superstructure* rests.

Built-up member. A structural member built from standard shapes that result in a single, stronger member.

Bulkhead. A temporary form, usually wooden, used to terminate a *concrete* pour. *Bulkheads* are placed at *construction joints*, *expansion joints*, or at the discretion of the Engineer.

Butt joint. (1) A joint with a vertical face that spans the width of the lane being paved. *Butt joints* are constructed when paving is stopped temporarily. (2) A union of two plates, end to end, without overlapping.

Calcium chloride. A crystalline compound (CaCl_2) used for controlling dust on dirt roads, *soil stabilization*, ice removal, other road-conditioning purposes.

Camber. A slight upward curve given to a plate *girder*, *beam*, *truss*, or *superstructure* during fabrication in order to compensate for the downward deflection that will result from the application of a load.

Castings. Cast iron items, such as manhole frames or inlets, or heavy metal plates with slots or openings used to cover drainage inlets.

Cast-in-place pile. A *pile* constructed either by drilling a shaft in the earth and filling the shaft with *concrete*, or by driving a hollow sheet-metal shell by means of a pile hammer. After driving, the mandrel is withdrawn and the shell is filled with *concrete*.

CCRL. Acronym for the *Concrete Cement Reference Laboratory*.

Cement. The common name for *Portland cement*.

Cement content. The *cement* factor is the number of pounds (kilograms) of *cement* used in one cubic yard (cubic meter) of *concrete*. The *cement* factor is usually predetermined by the *Specifications* for the class of *concrete* desired.

Centerline. A reference line from and to which important measurements are made and dimensions are given.

Certificate of Analysis. A manufacturer's statement of a laboratory's analytical test results of a *lot* or *batch* of material.

Certificate of Compliance. A manufacturer's statement that the *batch* or *lot* of material will meet the *specifications*, but does not always present test results.

Chair. A device that holds reinforcing *bars* the correct distance from the *forms* for *concrete*.

Chamfer. The edge or corner of a *concrete* structure, which is formed at an angle to give the structure a pleasing appearance and to prevent the edge or corner from chipping or breaking. *Chamfer* is accomplished by putting a *chamfer strip* into the corner of the formwork.

Channel. The bed where a stream of water flows. The term *channel* can also refer to a standard structural shape.

Cheekwall. A small section of *concrete* placed on the top of an *abutment* and adjacent to the *wingwalls*. Its purpose is to conceal the bearing assembly and protect the bearings from the weather.

Chord. The principal member of a *truss*, on either the top or the bottom.

Clay. A fine-grained *soil* exhibiting plasticity within a range of *water contents* and considerable strength when air-dried. An earthen material smaller than 0.002 mm but larger than 0.001 mm.

Cobble. A rock fragment usually rounded or semi-rounded with an average dimension between 3 and 12 inches (75 and 305 mm.)

Coefficient of variation. The *standard deviation* divided by the average, expressed as a percent.

Cofferdam. A structure built around a *foundation* site to keep water out of the excavation.

Cohesionless soil. A *soil* that when unconfined has little or no strength when air-dried and that has little or no cohesion when submerged. For example, sand.

Cohesive soil. A *soil* that when unconfined has considerable strength when air-dried and that has significant cohesion when submerged. For example, silt or clay.

Cold joint. A longitudinal joint between different *mats* in a hot-mix *asphalt* pavement made by placing fresh *asphalt* against older hardened or partially hardened *asphalt*.

Column. A vertical compression member that acts as a support. It may be constructed of *concrete*, steel, wood, or other materials. To be considered a *column*, the length of the member must exceed three times its least horizontal dimension.

Compaction. In construction, the decrease in volume and porosity of a material by its densification due to an applied dynamic force (e.g., rollers). The percent *compaction* is a ratio, expressed as a percent, of the dry *density* of a *soil* or *aggregate* in the field to its maximum dry *density*.

Compaction curve. The curve showing the relationship of the dry unit weight (dry *density*) as a function of the *water content* of the *soil* for a given *compactive effort*.

Compactive effort. The force applied to achieve *compaction*.

Concrete. A mixture of *Portland cement*, fine and coarse *aggregates*, and water.

Concrete masonry. As a general term, used to describe an artificial stone made basically from a controlled mixture of properly graded *aggregate*, *Portland cement* and water.

Conduit. A tube for receiving and protecting electric wires or cables.

Consolidation (settlement). This *settlement* is caused primarily by the expulsion of water from the *soil* voids beneath heavy structures or *embankments*. It is a time dependant process that occurs rapidly in granular *soil* and possibly in years for *cohesive soil*.

Construction joint. A plane surface between two sections of cast-in-place *concrete*, the second section having been placed on or against the first section after the first has hardened. *Construction joints* are typically formed when *concrete* placement must be stopped for a relatively long time.

Cope. To cut out the top or bottom *flanges* and web of a *beam* so that one member will frame into another.

Copper flashing. Sheets of copper, used to protect or seal the joints or edges of a structure.

Cores. Cylinders of *concrete* or *hot mix asphalt* cut from a location with a hollow drill.

Cores (rock). (By rotary core drilling.) The procedure used to obtain core *samples* of rock that cannot be penetrated by conventional sampling techniques. Typically, rock *cores* are obtained with diamond bits that yield a core *sample* diameter of 2 1/8" (NX barrel).

Cover plate. A plate used in building up *flanges* of a steel *beam* or *girder* to give greater strength and area or to provide protection.

Curing. The protection of *concrete* against moisture losses and extremes of temperatures that enables the chemical reaction to progress to a point where satisfactory performance of the *concrete* in the structure is ensured.

Cut-back asphalt. *Asphalt cement* that has been rendered fluid by fluxing it with a light volatile petroleum distillate. Upon exposure to atmospheric conditions, the volatile distillate evaporates, leaving only the *asphalt cement*, which reverts to its original semi-solid condition. Cut back *asphalts* are classified as SC (slow *curing*), MC (medium *curing*), or RC (rapid *curing*).

Cylinders (concrete). *Concrete* cylinders are made using cylinder molds and a *sample* of *concrete* being placed on a project. These cylinders are cured and tested in the lab, and are used to determine the compressive strength of the *concrete*. Refer to AASHTO T-22 for more information.

DelDOT. Acronym for the Delaware *Department* of Transportation. See *Department*.

Density. The *density* of a material is its weight-volume relationship, which is usually expressed in pounds per cubic foot (kilograms of material per cubic meter).

Density (Soil). These weight-volume relationships are designated as wet *density* and dry *density* obtained by *compaction*. Of primary importance are:

- (1) The *moisture content* of the *soil*;
- (2) The nature of the *soil* that is, its *gradation* and index properties; and
- (3) The type and amount of *compactive effort* required to achieve a specified *density*.

Department. An abbreviation used throughout this Manual as a reference to the Delaware *Department* of Transportation.

Diamond grinding. A term used to refer to grinding a *concrete* surface using a diamond plated grinder which is used to correct excess deviations in the pavement surface.

Diaphragm. Transverse structural members made of *concrete* or steel that furnish lateral support to the *beams* in a structure.

Distributor. A tank truck capable of applying emulsified *asphalt* in a uniform manner with *pressure*, volume, and temperature under definite control.

DOH. Standard Test Procedure used by the *Department* for which there is not a corresponding *ASTM* or *AASHTO* procedure, or for which sufficient modification of the *ASTM* or *AASHTO* procedure has occurred, to warrant a separate identification.

Dowel. A metal *bar* extending across a *concrete* joint to transfer the applied load and prevent misalignment at the joint.

Drain. A pipe, trench, or ditch provided for the purpose of leading water away from the structure.

Draindown. Occurs in *hot mix asphalt* paving when the *viscosity* of the *asphalt binder* is too low for the mix design. The *asphalt* runs off the *aggregate* and puddles at the bottom creating an *asphalt* poor top layer and an *asphalt* rich bottom layer. It can occur in storage, transportation, or paving.

Driven to refusal. The condition of a *pile* that has been driven until it cannot go any further into the ground.

Dummy contraction joint. A joint made with an edging tool or cut with a diamond tipped saw to localize cracking along a line. The depth of the joint does not extend through the full depth of the *concrete*.

Elevation. (1) The vertical distance from the known datum to a given point or a level surface passing through that point. (2) The drawing showing a vertical section of a structure.

Embankment. A structure of *soil*, *soil aggregate*, or broken rock placed between the *embankment foundation* and the *subgrade*.

Embankment foundation. The material below the original ground surface, the physical characteristics of which affect the support of the *embankment*.

Emulsified asphalt. A stable mixture of two immiscible phases of *asphalt* and water that contains a small amount of an emulsifying agent (emulsifier). The emulsifying agent keeps the *asphalt* suspended in the water and prevents the phases from separating.

Entrained air. *Entrained air* is due to the use of an *air entraining agent* in *Portland cement concrete*. It produces microscopic air bubbles which alter the capillary structure of the *cement* by blocking the capillaries. By doing so, it promotes freeze-thaw durability. Typical bubble diameter is approximately 0.08 inches (0.2mm).

Entrapped air. Air gets trapped in *Portland cement concrete* due to inadequate *compaction*. The air voids are macroscopic and often irregular in shape. These large *voids* do not contribute to the freeze-thaw durability, and *entrained air* does.

Expansion dam. A device used to control the expansion and contraction of a *bridge deck*, usually located over the *piers*.

Expansion joint. A joint in *concrete* or steel that is filled with a compressible material and allows the structure to contract and expand without damaging the structure or introducing excessive stresses.

Expansion joint material. Compressible material that is placed in an *expansion joint*.

Fabricated structural steel. Steel members made by fastening steel shapes, such as plates and angles, together by riveting or welding.

Fascia beam. A *beam* that exposes a face or side in its final position. Usually the outside *beam* of a structure.

FHWA. Acronym for the Federal Highway Administration.

Fillet weld. A triangular weld joining two surfaces at right angles to one another.

Fines. Small *soil* particles that will predominantly pass a US Standard 200 (75 μm) *sieve*. *Silt* and *clay* particles are often referred to as *fines*.

Finishing concrete. The art of working the surface area of *concrete* to a desired texture.

Float. A flat rectangular piece of wood, aluminum, or magnesium used for finishing *concrete*.

Fly ash. A by-product from coal fired power plants for which performance varies based on the source of coal. It is a finely divided material and is used to replace some of the *Portland cement* in a mix design. *Fly ash* reduces the permeability of *concrete* to salt and increases the strength. There are three classes, N, F, and C. The *Department* uses Class F. Specifications are in *AASHTO M-295*.

Footing. The part of a structure that rests directly on the surface of the ground, *pedestals*, or *piles*. The primary purpose of a *footing* is to spread the load from the structure so as not to exceed the allowable bearing strength of the *foundation* bed.

Forms. Assemblies of wood or metal that hold *concrete* in place while it is hardening.

Form ties. Metal devices of various kinds that prevent the *forms* for a *concrete* member from being spread apart when the *concrete* is placed in the *forms*.

Foundation. The underlying material upon which a *footing* rests.

Foundation pressure. The resultant *pressure* on a *foundation* due to the loads applied to the structure.

Friction piles. *Piles* that normally derive their principal support from friction or shear between the sides of the *pile* and the surrounding *soil*.

Geosynthetics. Manufactured products that are used extensively in geotechnical engineering that include geotextiles, geomembranes, geowebes, geonets, and geocomposites.

Girder. A horizontal member, either single or built-up, acting as a main member of a structure.

Gore. The area immediately beyond the divergence of two roadways, bounded by the edges of those roadways.

Grade line. A string or wire stretched tightly between stakes, placed to provide a reference or guide for *elevation*, *alignment* or both.

Gradation. The particle size distribution of *soil* and *aggregates* determined by using *sieves* with square openings.

Gravel. Small stones and pebbles that pass the 3 inch (75 mm.) *sieve* but are retained on the No. 10 (2.00 mm) *sieve*.

Green concrete. *Concrete* that has *set* but has not hardened fully.

Green lumber. Wood that still contains most of the water that was in it when the tree was cut down.

Ground blast furnace slag. See *slag*.

Ground finish. A smooth finish on a *concrete* surface, obtained by removing a thin layer of *concrete* with an abrasive tool or a suitable grinding machine.

Grout. A relatively thin, liquid mixture of *cement*, fine *sand*, and water, or of *cement* and water only.

Gunite. A type of *Portland cement mortar* “shot” into place by compressed air. The materials are mixed with water while being forced through a nozzle. Also referred to as shotcrete.

Gusset plate. A structural plate used to tie abutting members together at a joint.

Haunch. (1) An additional small section of *concrete* that is poured with the slab (monolithically) to give additional strength or support to the section itself and to the adjacent members. (2) The portion of the *arch* ring that is about midway between the skewback and the crown section. (3) The lower quarter of a circular pipe laid in a trench.

Headwall. A small *concrete* structure at the inlet end of a pipe.

Honeycomb. An area in *concrete* where there is a nest of particles of coarse *aggregate* and a lack of *mortar* to fill the spaces between them. Honeycombing typically results from incomplete consolidation.

Hook-bolts. Short steel *bars* with hooked ends joined by a threaded connection, used to fasten one *concrete* section to another.

Hot mix asphalt. A mixture of *asphalt cement* and well graded high quality *aggregate* thoroughly compacted into a uniform, dense mass. It is the common *asphalt* pavement. Synonymous with *bituminous concrete*.

Hydration. Crystallization of the *cement* particles resulting from the addition of water. The process by which *cement* combines with water to form gel.

Initial set. The condition of *concrete* or *mortar* when it has hardened just enough to retain its shape without side support.

Invert elevation. The lowest interior *elevation* in the arc of a pipe.

Joint filler. A flexible material used for filling or sealing joints while at the same time allowing movement of the joint.

Laitance. A weak, soupy *mortar* that appears on the top surface of *concrete* during and immediately after consolidation.

Lateral. A drainage ditch, pipe, joint, or similar structure running perpendicular to the *centerline* of the road.

Lift. (1) A layer of *soil* placed as part of an *embankment*. (2) A spread and compacted layer of *bituminous concrete* or *cement concrete* in a form.

Liquid Limit. The *moisture content* corresponding to an arbitrary limit at which a *soil* moves from a *plastic* state to a liquid state of consistency.

Lot. From an acceptance plan perspective, an isolated quantity of material from a single source, or a measured amount of construction assumed to be produced by the same process. (AASHTO)

AASHTO Materials Specification. A standard established by AASHTO that depicts physical and chemical properties that a material must conform to.

Masonry plate. A steel *bearing plate* securely fastened to the *concrete* support of a *bridge*.

Mass concrete. Placed *concrete* for which heat generation during the *hydration* process requires taking special precautions. Generally, structures, in which all the *concrete* is within 1.5 m of the nearest boundary – that is, structures consisting entirely of sections less than 3 m thick – do not require the employment of special measures to control the heat of *hydration*.

Mastic. A mixture of *bituminous material* and fine mineral matter, usually intended to remain in a *plastic* state for an indefinite period of time, that is used as an adhesive.

Mat. An assembly of lateral and longitudinal reinforcing *bars* tied together at their intersections.

Maximum dry density. The dry unit mass of a *soil* when it is compacted with standard *compactive effort* at optimum *moisture content*.

Median. The portion of a divided highway separating traffic traveling in opposite directions.

Mesh. An assembly of steel wires welded together at their intersections.

Mesh (sieve). The square opening of a *sieve*.

Mineral filler. Any material that will pass a US Standard 200 (75- μm *sieve*). It is used in a *bituminous concrete* mix to fill the very small *voids* and thus increase the stability of the pavement.

Mixing time. The period of time during which all materials for *concrete* or *hot mix asphalt* are in the revolving drum of the mixer.

Moisture content. The ratio, expressed as a percentage, of the mass of the water in a given *soil* to the mass of the solid *soil* particles.

Mortar. A mixture of fine *aggregate (sand)*, *cement*, and water.

Must-correct. A location in the pavement surface that consists of an excess deviation along a reference line of 25 feet (7.62 meters). These locations are typically required to be corrected through some course of action, usually *diamond grinding* of the area.

Nominal maximum size. (1) The largest *sieve* size listed in the applicable specification upon which any material may be retained. (2) In *SuperPave*TM, one *sieve* size larger than the first *sieve* to retain more than 10 percent of the material.

Non-plastic. Not capable of being molded into a sustainable shape.

Optimum moisture content. The percent of moisture at which a *soil* or *aggregate* can reach its maximum dry *density* with standard *compactive effort*.

Organic. Plant and animal residue in the *soil* that is in various stages of decomposition.

Overburden. The top layer of material in a *borrow* pit that is removed prior to the removal of the underlying, acceptable *borrow*.

Parapet. An outside wall, usually of *concrete*, that extends above the finished surface of a *bridge* and runs parallel to the *centerline* of the *bridge*. It acts as a guardrail for the *bridge* structure. A *parapet* is also a wall extending above the roof surface of a building.

Parapet railing. A railing placed on the top of a *parapet*.

Paste. A mixture of *cement* and water.

Pavement, flexible. A *pavement structure* that maintains intimate contact with and distributes loads to the *subgrade* and depends upon *aggregate* interlock, particle friction, and cohesion for stability.

Pavement, rigid. A *pavement structure* that distributes loads to the *subgrade*, having as one course a *Portland cement concrete* slab of relatively high bending resistance. (AASHTO)

Pavement structure. The combination of *subbase*, *base course*, and *surface course* placed on a *subgrade* to support the traffic load and distribute it to the roadbed. (AASHTO)

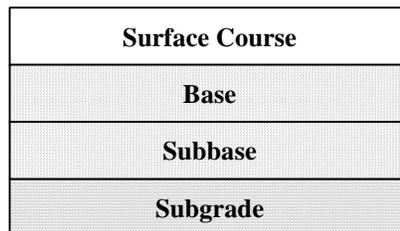


Figure F-1: Pavement Structural Design

Pedestal. (1) A small *concrete* support on the top of an *abutment* or *pier* that receives the bearing assembly. (2) A *concrete* support below the *footing*, used when a poor *soil* condition exists less than 3 m below the bottom of the *footing elevation*.

Performance Grade (PG). The method for grading or characterizing an *asphalt binder* for pavement applications. The system is based on the temperature range the *asphalt* is to perform under.

pH. The actual concentration of hydrogen ions in a solution. The values for the *pH* of a solution range from 0 to 14, with distilled water being 7. A *pH* less than 7 indicates an acidic solution ; a *pH* greater than 7 indicates an alkaline or basic solution.

Pier. A structure, usually of *concrete* or stone masonry, that is used to transmit loads from the bridge *superstructure* to the *foundation*, and is located between the *abutments*.

Pier cap. A cap placed on the top of *columns* to distribute the superimposed load.

Piles. Vertical or nearly vertical members, partly or entirely embedded in the ground, used to provide support for a structure where poor *soil* conditions exist.

Pile penetration. The vertical distance a *pile* moves as it is being driven into the ground.

Pipe bedding. The material located immediately below a pipe that acts as a *foundation* to support the pipe. *Pipe bedding* is divided into three classes: A, B, and C. These classes are defined in the Standard Construction Details.

Plain concrete. *Portland cement concrete* with no steel reinforcement.

Plant mix. Material mixed at a central location and delivered to the project site, usually *bituminous concrete*, *Portland cement concrete*, or similar materials.

Plastic. (1) The state or condition of *concrete* when it flows rather easily and can be readily placed in *forms*. (2) A *soil* is considered to exhibit *plastic* properties if it is capable of being molded into a sustainable shape.

Plastic Limit. The *moisture content* corresponding to an arbitrary limit at which a *soil* moves from a *plastic* state to a semisolid state of consistency.

Plasticity Index. A measure of the cohesive properties of a *soil*. Numerically, it is the difference between the *liquid limit* and *plastic* limit.

Portland cement. This is the type of *cement* most widely used in construction and the one that is usually meant when the term “*cement*” is used. *Portland cement* is produced in five types, described below, as well as several special types of which Type I and Type III are the most frequently used and are described below.

(1) *Type I.* The usual type used for general construction, and the one that is usually

- provided unless another type is specified.
- (2) *Type III*. A formulation to provide earlier strength attainment, also called high early strength *cement*, it attains in seven days a strength equivalent to the strength of Type I *cement* after 28 days.

Post tensioning. Inducing stress into a *beam*, after the *concrete* is properly cured, using tensioning cables.

Precast concrete. Any *concrete* or masonry unit that is cast in molds or *forms* at a location other than its final location.

Precast piles. *Piles* made from *precast concrete*. *Precast piles* are useful because they can be cast and cured under controlled conditions to achieve maximum strength. *Precast piles* are heavy and bulky, making them difficult to move and drive without proper equipment.

Prestressed concrete. *Concrete* in which a compressive load is applied during the manufacturing process by means of steel strands, wires, or rods, which are in tension in the *concrete*. The load is transferred as a compressive load in the *concrete* by means of a bond with the steel or by using special fixtures where the tendons emerge from the *concrete*.

Pressure. An applied force per unit area, measured in lb/ft², ton/ft² etc. or N/m² (Pascal).

Process control. See *quality control*.

PRI. Acronym for the Profile Index. The PRI is a quantification of the pavement smoothness that is measured using the California Profilograph.

Proctor test (moisture density relationship test). A test to determine the interrelationship between dry *density* and changing *moisture contents* of a *soil*. The maximum dry *density* and optimum *moisture content* of a *soil* is determined in this test. Refer to AASHTO T-99 and T-180 for more information.

Proficiency samples. Samples sent either by AMRL or CCRL for testing and the results are used to grade the performance of the laboratory's testing operation.

Polymer Modified Asphalt. *Asphalt binders*, which are required to have a wide range of performance, are often polymer modified. PG 76-22 is the typical polymer modified *asphalt* used by the *Department*. The polymers are generally dissolved in the *asphalt* at the to increase the elasticity of the *asphalt*.

Pozzolan. A material, which by itself is not cementitious, but when combined with the lime in *Portland cement* reacts with water to produce cementing properties. There are two classes, natural and artificial. Natural *pozzolans* are volcanic ashes, while artificial *pozzolans* are *slag*, *fly ash*, and *silica fume*.

Prime coat. A low-*viscosity asphalt* applied to penetrate, bond, and stabilize an existing surface and promote *adhesion* to the overlaying course.

Profile. The *elevations* of a series of points along a continuous line. *Profiles* are required for the construction of roads, drives, pipelines, *drains*, ditches, etc. They are usually plotted on the drawing with the horizontal scale greater than the vertical scale in the ratio of 10:1.

Pumping. (1) A condition occurring in the field where an *embankment lift* heaves and rolls under loading conditions because of excess moisture conditions. Typically, when the *moisture content* of the *soil* exceeds the optimum *moisture content* for that *soil*, conditions for *pumping* exist. (2) In a pavement, the loss of *finer* from the *subgrade* through cracks or joints in the pavement under the action of traffic. *Fines* are carried through the crack by water forced through the crack when a vehicle depresses the slab slightly on a fine-grained, non-draining base or *foundation*.

Qualified Laboratory. An *accredited laboratory* or a laboratory approved by the *Department*.

Quality Assurance. All those planned and systematic actions necessary to provide confidence that the product will perform satisfactorily in service.

Quality Control. Those actions necessary to assess production and/or construction so as to control the level of quality in the end product.

Quartering. A prescribed method for reducing a *sample* into a small *lot* for testing.

Random Sampling. A procedure for obtaining non-biased *representative samples* where there is an equal probability that any one of a group will be selected.

RAP. An abbreviation for Recycled *Asphalt* Pavement or Reclaimed *Asphalt* Pavement. It is pavement, which has been milled and stockpiled. It can be used as is or can be processed by further grinding. *RAP* is sometimes used in *hot mix asphalt* in amounts dictated by the mix design.

Replicate sample. One of several identical *samples*.

Reinforced concrete. *Portland cement concrete* in which steel reinforcement is embedded.

Reinforcing steel. Steel *bars*, wires, or rods placed in *concrete* to bear tensile forces. Epoxy coating is often used on *reinforcing steel* to resist corrosion. Non-coated *reinforcing steel* is sometimes referred to as black steel. Synonymous with rebar.

Representative sample. A non-random *sample* which in the opinion of the sampler represents the average condition of the material in question.

Retaining wall. A wall built to hold back earth or loose rock so that the material behind the wall will not slide or cave in.

Retarder. An *admixture* that slows or retards the setting of *concrete*, but has little or no effect on strength gain after the *initial set*.

Rip-Rap. A material, usually consisting of stones, broken *concrete*, or similar materials used to stabilize an *embankment* or a spillway in order to control erosion.

RQD (rock quality designation). A general method by which the quality of the rock at a site is obtained based on the relative amount of fracturing and alteration. RQD is determined by summing up the lengths of those portions of a core run that are 4 inches or greater in length and dividing by the core run (usually 60 inches).

Rubberized asphalt. *Bituminous materials* mixed with a small amount of rubber and used for filling and sealing joints and cracks.

Sack. Equivalent to 94 pounds (43 kg) of *Portland cement concrete*.

Sample. A small quantity representing a *batch* or *lot* of material, which has the same composition and physical characteristics as the whole.

Sand. Material that will pass the No. 4 (4.75 mm) *sieve* and be retained on the No. 200 (0.075 mm) *sieve* with the following subdivisions:

Coarse – passes a No. 10 (2.00 mm) *sieve* and retained on a No. 40 (0.425 mm) *sieve*

Fine – passes a No. 40 (0.425 mm) *sieve* and retained on the No. 200 (0.075 mm) *sieve*

Saturated surface dry (SSD). An *aggregate* is considered to be SSD when there is no free moisture present, but the *aggregate* is in a non-absorbent state. In other words, the *aggregate* has all the moisture it can absorb and the *aggregate* surface is dry.

Screed. A long piece of wood or metal moved across the surface of newly-placed *concrete* with a sawing motion to consolidate the *concrete* and smooth the surface.

Scuppers. Special *drain* inlets used to dispose of surface water on *bridge decks*.

Sealer. See joint *sealer*.

Segregation. The separation of coarse material from finer material.

Set. The hardening of a mixture of *grout*, *mortar*, or *concrete*. The process by which the *cement* in freshly mixed *concrete* or *mortar* combines with water and hardens. Setting up is caused by *hydration*.

Settlement. The downward movement of a structure due to its own weight, the loads that it supports, or consolidation of the supporting *soil*.

Shop drawings. Plans developed and submitted by the contractor; these plans show the detailed dimensions of component parts, their positions relative to each other, and method of assembly and fabrication.

SHRP. Acronym for the Strategic Highway Research Program.

Sieve. A frame enclosing a wire, cloth or perforated plate used to separate materials by particle size.

Silica Fume. Micron size particles of SiO_2 and is used in *Portland cement concrete* to reduce the permeability of *concrete* to salt and to increase the compressive strength. It is also called microsilica.

Silt. *Soil* passing the 0.075 mm (NO. 200) *sieve* that is *non-plastic* and exhibits little or no strength when air-dried.

Skin friction. Friction between the outside surface, or skin, of a *pile* and the surrounding *soil*. *Skin friction* resists vertical movement of the *pile* in the *soil*.

Slab jacking. The act of raising a slab-on-ground, most commonly a paving slab, by pumping a slurry under *pressure* through holes drilled through the slab. Slurries may also be made from *cement*, *asphalt*, or similar materials.

Slag. *Slag* is a by-product of steel making and is referred to as *ground blast furnace slag*. It is processed and certified and is usually sold in two grades, 110 and 120. Grade 120 means the use of the *slag* in the *blended cement* will have a compressive strength 20% higher than straight *cement*. *Slag* can be incorporated either at the *cement* mill or at the mix plant.

Slump. The consistency of fresh *concrete* measured using a *slump* cone, and reported in inches or millimeters.

Soil. Sediments or other unconsolidated accumulations of solid particles produced by the physical and chemical disintegration of rocks, which may or may not contain *organic* matter.

Soil cement. A calculated percentage of *cement* is blended with a *soil* of known *moisture content*. The *soil cement* can be placed beneath road pavements or serve as a riding surface for low traffic roads.

Sole plate. A plate located at the base of a *beam*, partition, *column*, or similar structure to distribute the load at the point of support.

Specific gravity. The ratio of the weight of the absolute volume (solid volume) of a material to the weight of an equal volume of water (*density* of the object divided by the *density* of water).

- (1) *Apparent* - The ratio of the weight in air of a unit volume of solids to the weight in air of an equal volume of water.

- (2) *Bulk* – The ratio of the weight in air of a unit volume of a permeable material (including *voids*) to the weight in air of an equal volume of water.

Specifications. The compilation of provisions and requirements for the performance of the prescribed work. This includes the *Standard Specifications*, *Supplemental Specifications*, and *Special Provisions*. The *Specifications* pertain to, among other things, the method and manner of performing the work, the quantities of material to be furnished under the Contract, and the quality of the finished work.

Split sample. A *sample* taken from a common source and split into several smaller quantities such that all smaller quantities are of identical composition.

Stabilization. Modification of *soils* or *aggregates* by incorporating materials that will increase load bearing capacity, firmness, and resistance to weathering or displacement. (*AASHTO*)

Standard deviation. A statistical term which is the positive square root of the variance. It is used to describe variability in a group. A *standard deviation* is often referred to as sigma.

Steel beam piles. *Piles* made of structural steel, usually formed into H sections.

Steel pipe piles. Sections of steel pipe driven into the ground and usually filled with *concrete*.

Stiffener. A vertical steel plate or angle used to give additional strength to a steel *girder*.

Strip. (1) To remove *forms* from *concrete* that has hardened. (2) Removal of *asphalt* from the pavement surface.

Subbase. One or more layers of specified material thickness placed on a *subgrade* to support a *base course* (or in the case of rigid pavement, the *Portland cement concrete slab*).

Subgrade. The existing *soil* or rock that the *subbase* is placed upon for a *pavement structure*.

Subgrade Treatment. Modification of the roadbed material by *stabilization* using *cement* or other materials.

Sublot. A subdivision of a *lot* or *batch*.

Substructure. The portion of a *bridge* below the top of *abutments* or *piers*. It consists of a *footing* and an *abutment* or *pier*, and may also consist of *piles* upon which the *footings* are constructed. The function of the *substructure* is to support the *superstructure* and transmit the loads down into the ground.

Superelevation. The banking of the outside of a roadway on a horizontal curve or turnout.

SuperPave™. The acronym for Superior Performing *Asphalt Pavements*.

Superstructure. The parts of a *bridge* above the level of the end supports, including the *beams*, the *bridge deck*, and the *parapet* wall.

Surface Course. Layer(s) of a *pavement structure* designed to accommodate the traffic load, the top layer of which resists skidding, traffic *abrasion*, and the disintegrating effects of climate. The top layer is sometimes called the “wearing course”.

Surface or free moisture. All the water retained by *aggregates* in excess of the quantity required for practical internal saturation. It is expressed as a ratio of the weight of this water to the weight of the surface-dry internally saturated *aggregates*.

AASHTO Testing Specification. A defined set of procedures, approved by *AASHTO*, to perform specific test processes.

Tack coat. Prior to paving, it is a light application of a diluted emulsified *asphalt* to an existing *asphalt* or *concrete* pavement to insure a bond between the old surface and the overlaying course.

Tamper. A tool for compacting *backfill* in areas that cannot be reached by rollers.

Ticket (load). The document accompanying a load of material that provides information regarding the material.

Ties. Steel wire used for securing steel reinforcement at intersections or overlapping joints.

Tolerance. The allowed range for test values from the average. Generally for control charts it is three sigma, which represents a 99% confidence interval.

Tremie. A pipe, open at the top and bottom, used to drop fresh *concrete* vertically without *segregation*. *Tremies* are usually used for placing *concrete* in water.

Trial mix. A *concrete* mixture designed by the Contractor using the materials intended for use on the Project.

Validation. The signature or initials of an authorized individual or any form or ticket denoting that the information is as stated.

Variation. Differences in measured values due to chance, or outside the norm due to an assignable cause.

Verification sample. A *sample* obtained from the supplier to be tested by the *Department* to verify the product meets the published analytical results or specifications. A verification *sample* can either be a *random sample* or a *representative sample*.

Verification sampling and testing. Testing by the *Department* to verify the product meets the specifications.

Vibration. The act of rendering fresh *concrete* into a quasi-liquid state, by the application of high-frequency, vibratory impulses, for the purpose of consolidation in the *forms*.

Vibrator. A mechanical device for shaking fresh *concrete* rapidly so that *entrapped air* and excess water is released and the *concrete* settles firmly in place in the *forms*.

Viscosity. The property of a fluid that resists internal flow. It is how “thick or thin” the fluid is.

Void. A small air pocket or hole in a material, usually caused by a lack of consolidation. In *soils*, the volume that is not occupied by solid particles, but is filled with air or water.

Volume change. Expansion and contraction of a material resulting from moisture or temperature *variations*.

Water-cement ratio. (1) The ratio of the weight of total water to the weight of *cement* in a *batch* of *concrete*. (2) The number of gallons (liters) of water per *sack* of *cement* in a *batch* of *concrete*.

Water content. See *moisture content*.

Waterproofing. The application of an *asphalt*, epoxy, or silicon material to the unexposed side of a *concrete* structure to protect it from water damage.

Water table. The depth below the ground surface at which the *soil* is nearly saturated with water. If an excavation goes below the *water table*, water can be observed to flow into the excavation. The *water table* is also referred to as the groundwater table.

Wearing surface. See *surface course*

Weep holes. Small drainage holes placed in a structure to permit trapped water to escape.

Wire mesh. (Welded-wire fabric). A series of longitudinal and transverse wires arranged substantially at right angles to each other and welded together at all points of intersection (ACI). (See Standard *Specifications* Section 824; *AASHTO* M55)

Wingwall. A part of a bridge *abutment* outside the main body of the structure. Its purpose is to retain the approach fill.

Yield. (1) The quantity of material that is produced by a given *batch*. It is quantified by the volume of material produced.