Reduced impact on the environment

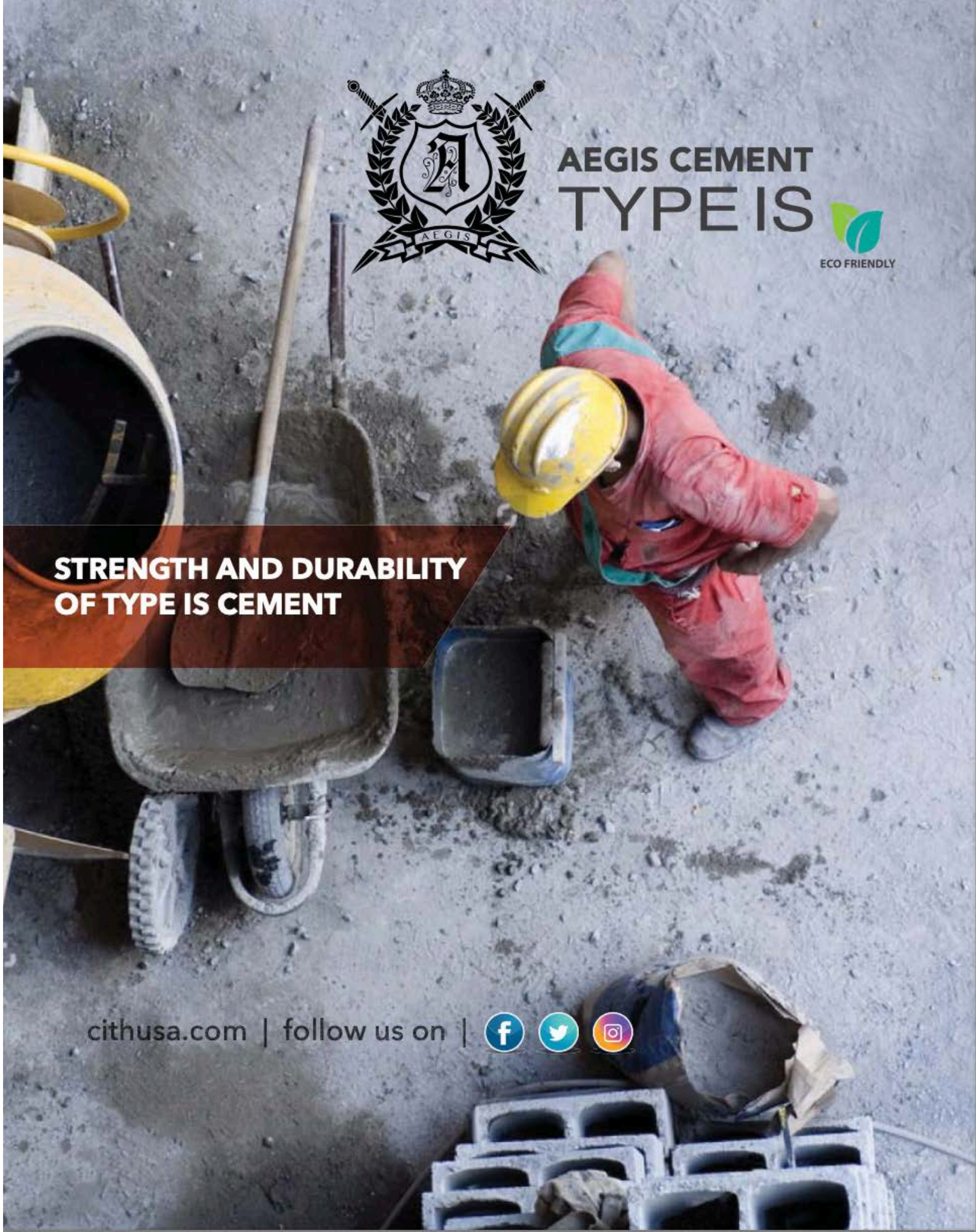
AEGIS CEMENT

ECO FRIENDLY

WHO WE ARE

Aegis Cement enhancing the quality of life by providing professional, innovative building solutions, using only high quality eco-friendly products. NZE2050

aegis cement next generation



WHAT IS TYPE IS CEMENT?

Slag cement is a recovered material from the iron production process and because of this, reduces the environmental impact.

Material, Energy and Greenhouse Gas Savings

When slag cement reduces the amount of Portland cement in concrete, three principal environmental benefits result:

- **Avoided use of virgin raw materials**
- **Avoided energy**
- **Avoided greenhouse gas**

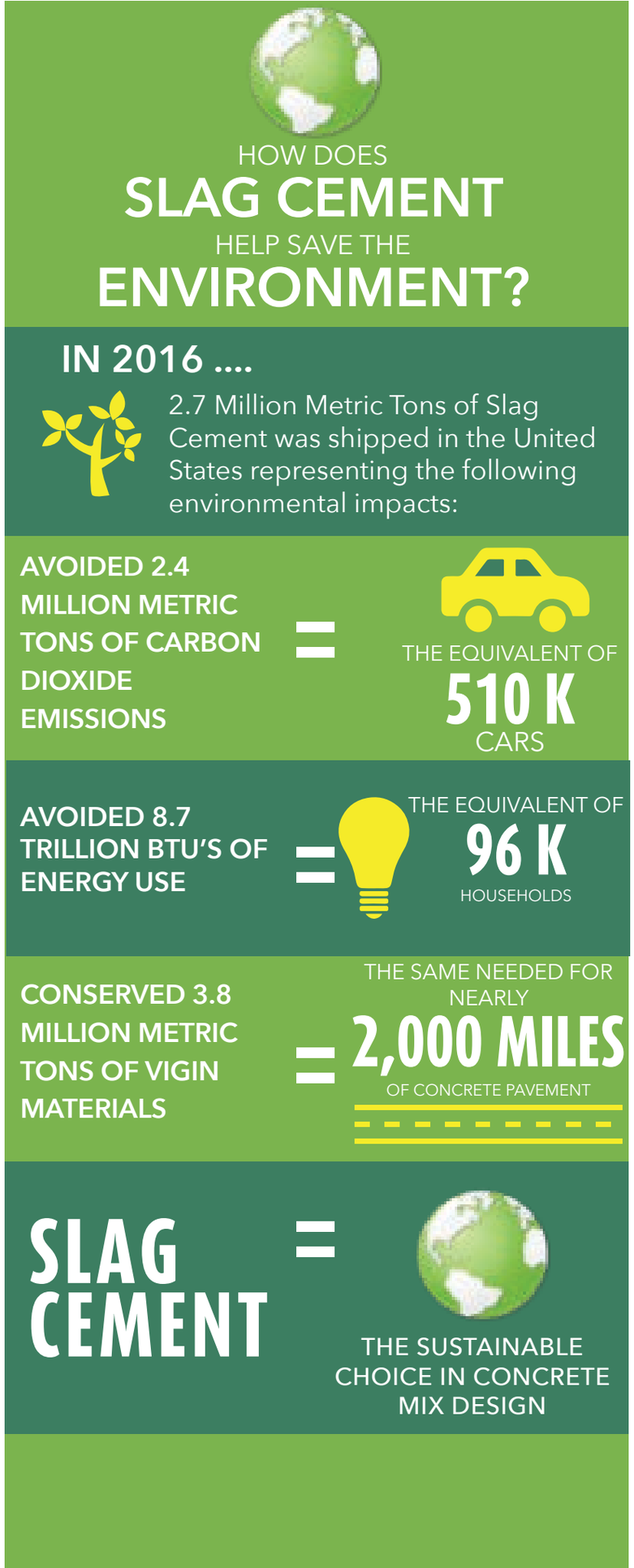
Quantifying these environmental impacts is important when comparing alternatives and when setting policy priorities.

The “S” in Type IS means SLAG. Slag cement (also called ground granulated blast furnace slag) is a hydraulic cement produced during the reduction of iron ore to iron in a blast furnace.

Molten slag is tapped from a blast furnace, rapidly quenched with water ("granulated"), dried and ground to a fine powder. The rapid quenching "freezes" the molten slag in a glassy state, which gives the product its cementitious properties.

Once the slag has been cooled and ground to a usable fineness (Blaine 5200) it is stored and shipped to suppliers. Slag cement is commonly found in **ready-mixed concrete, precast concrete, masonry, soil cement and high temperature resistant building products.**

ECO FRIENDLY



Reduced impact on the environment

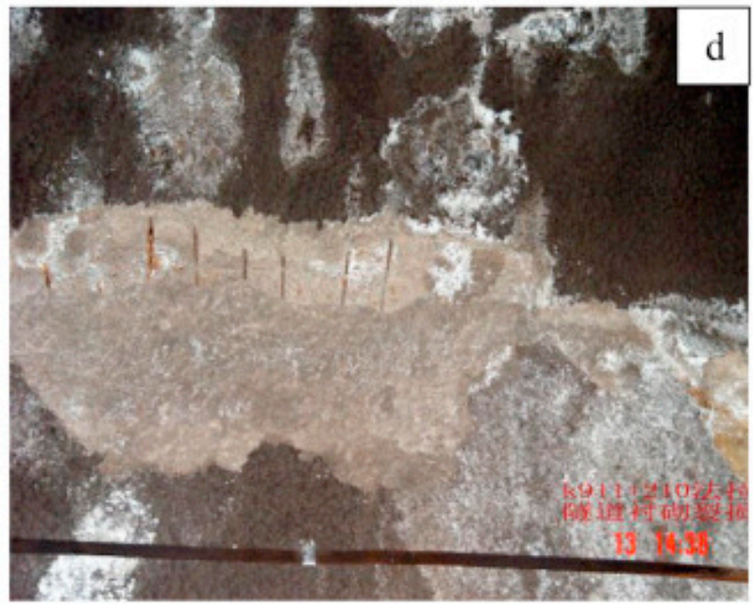
The use of Type IS Cement has demonstrated long-term performance enhancements allowing designers to reduce the environmental footprint of concrete while ensuring improved performance and increased durability.

APPLICATIONS FOR TYPE IS (SLAG) CEMENT

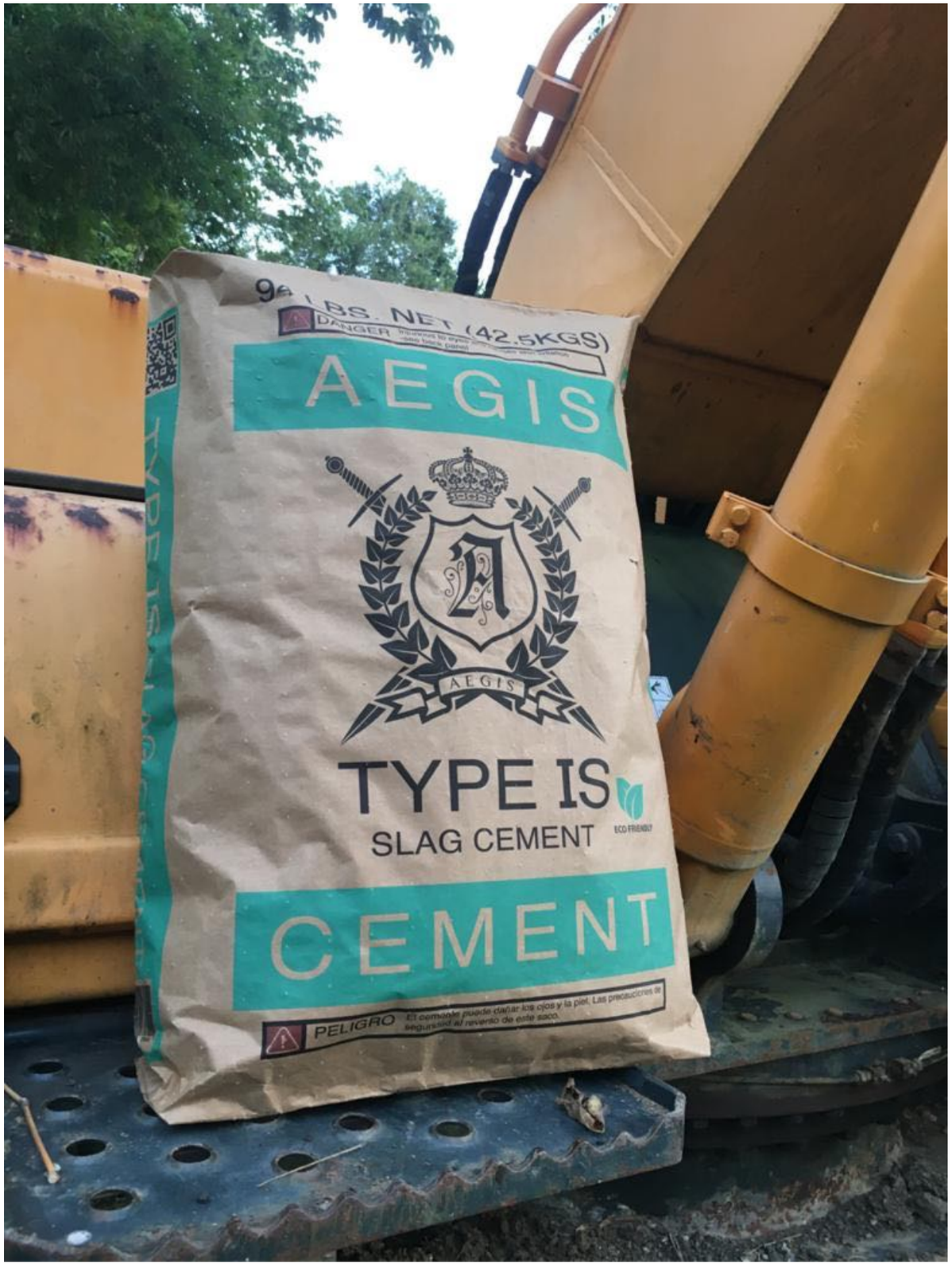
- Concrete roads and airport runways - Slag cement is the only cement approve by DOT for road works and use on airport runways, mainly due to its high PSI strengths but also because of improved visibility (which is crucial in both applications).
- Structures and foundations.
- Mass concrete applications, such as dams or retaining walls.
- Precast and pre-stressed concrete.
- Pipe and Block.
- Concrete exposed to harsh environments, such as wastewater treatment and marine applications.
- High-performance/high-strength concrete, such as high-rise structures or 100-year service life bridges.

WHAT ARE SOME OF THE GREATEST CAUSES OF CONCRETE DETERIORATION?

- PERMEABILITY AND CHLORIDE INDUCED CORROSION
- SULPHATE ATTACK
- ALKALI-SILICA REACTION (ASR)



There are several ways to mitigate ASR:



•One option is to limit the alkali content of the concrete by minimizing the amount of alkali contributed by the Portland cement.

•Another solution is to limit or prohibit the use of reactive aggregates. **It is often impractical** to specify either of these options if suitable materials (low-alkali cements or nonreactive aggregates) are not available.

•It is very difficult, **if not impossible**, **to halt the ASR reaction once it begins**. It may be possible in some instances to limit the ingress of water into the concrete, but this will only slow down rather than stop the progress of deterioration. The best way to mitigate ASR is to prevent its occurrence through the proper use of materials in the concrete mixture by using Slag Cement

GBFS IS ALSO ROUTINELY USED TO LIMIT THE TEMPERATURE RISE IN LARGE CONCRETE POURS.

The more gradual hydration of GBFS generates both lower peak and less total heat than Ordinary Portland Cement.

This reduces thermal gradients in the concrete, which prevents the occurrence of micro cracking. This can weaken the concrete and reduce its durability.

Due to its much lower lime content and lower permeability, GBFS is effective in preventing efflorescence when used at replacement levels of 50% to 60%.

SLAG CEMENT CONTRIBUTIONS TO LEED CERTIFICATION

LEED™ stands for Leadership in Energy and Environmental Design and is a product of the U.S. Green Building Council. It is a set of national standards used to certify high-performance, sustainable buildings.

LEED-NC is the most widely-used of these standards and is used for new construction or major renovations. LEED-NC utilizes a point-based system to rank specific levels of sustainable performance in six categories. **Slag cement can contribute to achieving 13 specific LEED-NC points**.

AEGIS

ECO FRIENDLY

AEGIS CEMENT

CASE STUDIES AIRPORT PAVEMENT RESTORATION

1) **Cheyenne Regional Airport Pavement Restoration - 2022** For this airport, slag cement was used deliberately for durability, increased strength, ASR mitigation, and lighter color (improved visibility). The application of slag cement succeeded in achieving close to 28-day flexural strength in just 7 days, yielding 620 psi avg flexural strength (28-day flexural strengths average 700–750 psi).

2) **Jamestown Municipal Airport Runway - 2021** This was a US$6.7M project to reconstruct and upgrade the existing runway and taxiway. There was a strong lobby to use asphalt, however, the strength and durability of slag cement defined it as the better choice. Using slag cement exceeded the require specs for the project - achieving a 28-day cylinder strength of 7,620 psi. An added benefit, not a requirement of the project, is the bright white finish which aids with visibility.

3) **JFK International Airport - 2015** The aim here was to rehabilitate the existing asphalt runway with a concrete overlay. The mix design specifications demanded a minimum flexural strength of 700 psi after 28 days and a low chloride permeability. Slag cement was recommended as the product of choice due to its increased flexural strengths, ability to reduce concrete permeability and mitigate alkali-silica reaction (ASR). The use of slag cement in this application exceeded the requirements for for constructability, strength, durability, and smoothness – *all at a reduced environmental impact*. Thus being recognized as the SCA 2015 Project of the Year Award recipient in the category of sustainability.

WHY TYPE 1S CEMENT IS BEST FOR ROAD WORKS

Type IS Cement and its exceptional characteristics including increased durability, ASR mitigating properties, and its ability to stabilize the cement paste to create a more robust environment for the development of air entrainment make it an ideal choice for road works.

In 2011, an 88-lane mile stretch of the I-275 highway was repaved through Wayne and Oakland Counties, in Metro Detroit, Michigan. This project did not include Type IS Cement and the road surface failed due to ASR and a poor air void system. The Michigan Department Of Transportation (MDOT) specified the use of Type IS Cement for its hardened concrete characteristics such as increased durability, and ASR mitigating properties. MDOT is also of the opinion that Type IS Cement helps aid in creating a more stable paste for the proper development of air entrainment. The contractor, who likes Type IS Cement for its rheological properties, appreciates its added creaminess and its ability to hold a nice edge. Therefore, Type IS Cement was instrumental in delivering the best road surface and finished product for MDOT and motorists.

The I-96 Reconstruction (2014)

- Type IS Cement was used in concrete mixtures for the roads and bridges.
- The road portion of the project used 62,000 tons of Type IS Cement in a 70:30 ratio of OPC:Slag.
- Using Type IS Cement resulted in a lighter appearance for enhanced nighttime visibility.
- The consistency and performance reliability of the mixture also contributed to rapid completion of the project.
- A minimum of 30% slag cement ratio was needed to provide mitigation of potential alkali-silica reaction (ASR) as required by the Michigan Department of Transportation (DOT) concrete specifications.
- Had higher ratios been utilized, the finished product would have been even better.
- AEGIS Type IS Cement offers a blend of 50:50 [OPC: Slag] for maximum performance and workability.

Reviving the I-275 (2017)

- The Michigan Department of Transportation (MDOT) spent $75 million to replace 88 lane miles of road on I-275 through Wayne and Oakland Counties, in Metro Detroit, Michigan.
- This particular stretch of I-275 is the busiest stretch of freeway in Michigan.
- Because of this, MDOT instituted a $150,000/day penalty if the freeway was not open September 1, 2016.
- MDOT also specified the use of Type IS Cement in the scope of work for its superior durability and alkali silica reaction (ASR) mitigating properties, to name a few.
- Since the work started the last week of May, 2016, with a government stipulated deadline of September 1st, the contractors chose to utilize, a Type IS (50 blend) [ASTM C 595 blended cement]. (which is the blend that we are offering in our AEGIS Type IS Cement)
- The paving totaled 200,000 cubic yards (yd3) of concrete, so the contractors knew that utilizing Type IS Cement as a blended product would work best, logistically, to meet the demands of the tight schedule, avoid penalties, and deliver the best finished product.

WHY MDOT SPECIFIED THE USE OF TYPE IS CEMENT IN THESE ROADWORKS

- For its exceptional characteristics including increased durability, ASR mitigating properties, and its ability to stabilize the cement paste to create a more robust environment for the development of air entrainment.
- To best meet the logistics of this very fast tracked project.
- This stretch of I-275 was totally reconstructed and paved just 16 years ago.
- This previous road did not include slag cement and the structure failed due to ASR and a poor air void system.
- MDOT specified the Type IS Cement for its hardened concrete characteristics such as increased durability, and ASR mitigating properties.
- MDOT is also of the opinion that Type IS Cement helps aid in creating a more stable paste for the proper development of air entrainment.
- The contractor, who likes slag cement for its rheological properties, appreciates its added creaminess and its ability to hold a nice edge.
- Therefore, Type IS Cement was instrumental in delivering the best roads to MDOT and motorists.

The I-96 Reconstruction (2014)

CASE STUDIES
PANORAMA BUILDING

This 83-story, mixed use building is the tallest residential building on the eastern seaboard, south of New York. Building use consists of medical offices, teaching facilities, a hotel, restaurants, retail space, and over 800 luxury rental apartments. Slag cement was used in over 13,000 cubic yards of concrete used for the mat foundation (9000 psi required), all vertical elements and 50% of the elevated decks. The Slag cement used in the mass concrete of the mat foundation allowed for higher strength gains and reduced peak heat of hydration.

CASE STUDIES OCEAN FRONT RESIDENCE

Approximately 1300 yards of concrete were used throughout this uncommon residence. Concrete was used for the tennis pavilion, an underground tunnel to this pavilion, benches, planters and stairs as well as the supporting structure. Only a small portion of the home can be seen from the outside; thus the need for sulfate resistance. The concrete walls, floors, and ceilings show a wood appearance created with white pine forms.

40% slag was used in all the concrete. Several mockups were used to ensure the right workable mix ensuring no bug holes. Many homes in the Hamptons are built with wood shingles which do not hold up to the salt exposure and freeze thaw of winter and the threat of impacting storms was also a large concern for the owners. Slag was used for sulfate resistance which added winter durability and strength against hurricanes.

This home sits between the Shinecock Bay and Atlantic Ocean where the views are spectacular. Added strength facilitated by the slag allowed the architect to maximize the views by designing long spans through the use of post-tensioned and high-strength concrete. The use of these long open spans also maximized the view of the water.

AEGIS CEMENT NEXT GENERATION

CIT HOLDINGS USA

Choose the right Cement

ANALYSIS CERTIFICATE
Aegis Cement Type: Type IS
Blast Furnace Blended Hydraulic Cement

Test Items	Result	Method/Standard No	Test Items	Result	Method/Standard No.
SiO_2	28.68%	ASTM C114	Fineness (45 μm)	1.2%	ASTM C430-08
AI_2O_3	7.80%	ASTM C114	Soundness	0.04%	ASTM C151/C151M-09
Fe_2O_3	3.12%	ASTM C114	Spesific Surface	5170 cm^2/g	ASTM C2404 - 11
CaO	49.99%	ASTM C114	Initial time of setting	168 min	ASTM C 191-13
Mgo	4.40 %	ASTM C114	Final time of setting	220 min	ASTM C 191 - 13
SO	2.69 %	ASTM C114	Compressive strength (1d)	16.3 Mpa 2363.5 psi	ASTM C 109/C109M-13
Na_2O	0.28 %	ASTM C114	Compressive strength (3d)	26.1 Mpa 3784.5 psi	ASTM C 109/C109M-13
Loss Of Ignition	0.86 %	ASTM C114	Compressive strength (7d)	33.6 Mpa 4872.0 psi	ASTM C 109/C109M-13
Insoluble Residue	0.27 %	ASTM C114	Compressive strength (28d)	54.4 Mpa 7888.0 psi	ASTM C109/C109M-13

The philosophy behind Aegis Cement

Aegis Has Greek and Latin Roots

We borrowed "aegis" from Latin, but the word ultimately derives from the Greek noun *aigis,* which means "goatskin." In ancient Greek mythology, an aegis was something that offered physical protection. In some stories, it was the thundercloud where Zeus kept the thunderbolts he used as weapons or the name he gave to the shield he used to protect his people. In others, the aegis was a magical protective cloak made from the skin of the goat that had suckled Zeus as an infant. The word first entered English in the 15th century as a noun meaning "shield" or "protection," and by the 20th century it had acquired the extended senses of "auspices" or “sponsorship."

The philosophy behind our brand is deep-rooted in strength, protection, stability and reliability. We are proud of our name and every element of our crest has been well thought-out:

(i) shield engraved with A for Aegis - significant of Zeus’s shield;

(ii) two swords - denote protection and strength;

(iii) crown - respect;

(iv) laurel wreath - symbolic of victory and honor.