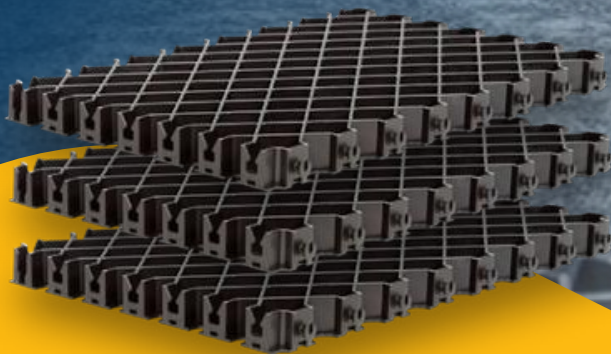




SEVEN STAR
INFRASTRUCTURE PTY LTD

INSTALLATION GUIDE

Heavy Duty Concrete Pavement
Light Duty Concrete Pavement
Permeable Pavement Unbound Pavement



Diamond Grid Specifications
Subgrade Preparation
Subbase Preparation
Edge Preparation
Diamond Grid Implementation
Concrete & Fill Applications



DIAMOND GRID™



Install



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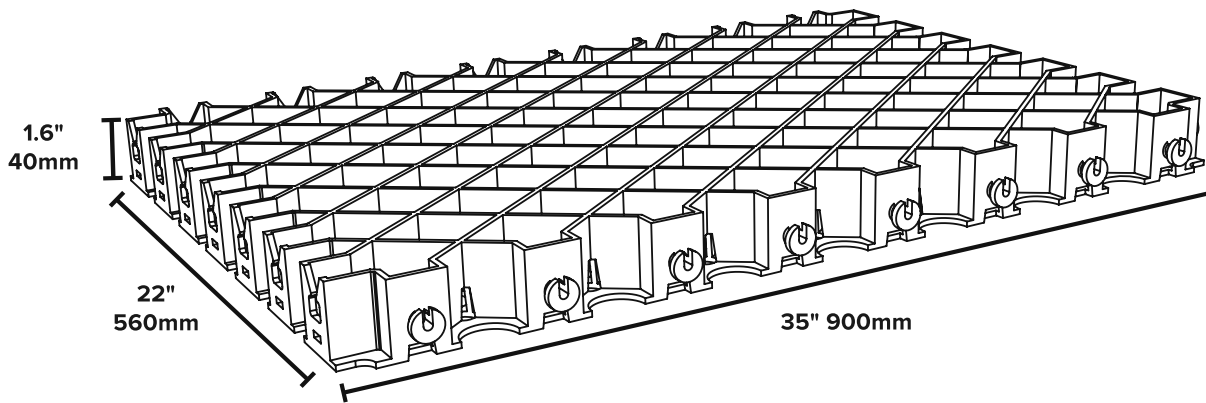
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Grid Specifications.



Measurements 35" W x 22" L x 1.6" H - 900mm W x 560mm L x 40mm H

Crush resistance 700+ Tons/sqft filled* - 7000+ tonne m2*

(filled with gravel/road base) 30 tons/sqft empty* - 300 tonne m2*

Crush resistance 7.05 lbs - 3.2kg

(empty grid) 1 cubic yard of fill per 207.9 square feet - 1 cubic meter of fill per 26m2

Weight per grid Up to 96%

Fill ratio Road base, gravel, pebbles, grass, soil, concrete, asphalt

Permeability



UNIVERSITY
OF SOUTHERN
QUEENSLAND



Made from 100% recycled, UV treated polypropylene, Diamond Grid is ecologically friendly and highly durable. The product has been load tested by the Facility of Engineering and Surveying Centre of Excellence in Engineered Fiber Composites, University of Southern Queensland and Sageos CTT Group and found to withstand loads in excess of 30 tons per square foot when empty or over 7000+ tons crush resistance per ft² when grids are filled.

Technical Benefits.

Surface Consideration:	CONCRETE	CONCRETE SLABS / PAVERS	ASPHALT
Longevity	15-20 years	10-15 years	5-10 years
Materials Required	Cement and steel mesh, framework required	Cement slabs (pre-cast)	Asphalt mixture (tar and aggregate)
Maintenance	Low - prone to cracking and becoming unlevelled	Low - can become cracked and unlevelled	High - Ongoing maintenance, top seal every 2-3 years
Cost & Appearance	Black, uniform, industrial, high cost	Options available at a cost	Uniform, options available at a higher cost
Permeability	N/A	15-30%	N/A
Depth	Varies from 3-11" depending on application	Varies from 4-6" depending on application / loads	Average of 4 - 4.5"
Eco Friendliness	High impact, not recyclable or reusable, high ground runoff, ground suffocated, can generate acid	High impact, not recyclable or reusable, requires waster dump if removed, suffocates ground	High impact if dumped/ removed, uses oil based derivatives, not recyclable or reusable, high ground runoff, ground suffocated



30+ years

100% recycled polypropylene

Very low - May require some gravel or grass maintenance

Variety of fills available at low cost to blend into natural environment

Up to 100%

Varies from 1-2"

Low impact, uses recycled materials, can be moved, reused or replaced, up to 100% permeability, low runoff, ground maintains breathability

Subbase Preparation Guide.

Base Preparation Recommendations for Diamond Grid™

Load Description	Estimated depth of engineered base		Concrete Pavements	Permeable Pavements
	Subgrade CBR ² 2 – 4 ³	Subgrade CBR ² > 4 ³		
 Heavy Truck Access Gross vehicle loads of 66,000lbs or 36T ¹ . Infrequent passes ⁴ .	6 in (150 mm)	4 in (100 mm)	Page 5	Page 9
 Truck Access Gross vehicle loads of 44,000lbs or 20T. Infrequent passes ⁴ .	4 in (100 mm)	2 in (50 mm)	Page 5	Page 9
 Utility & Delivery Truck Gross vehicle loads of 22,000lbs or 10T. Infrequent passes ⁴ .	2 in (50mm crushed stone/rock compacted)	2 in (50 mm crushed stone/rock compacted)	Page 5	Page 9
 Cars & Pick-up Trucks Gross vehicle loads of 8,800 lbs or 4T. Infrequent passes ⁴ .	nil ⁵	nil ⁵	Page 5	Page 9
 Trail Use: Loading for pedestrian, equestrian, motorcycle & ATV traffic.	nil ⁵	nil ⁵	Page 5	Page 9

1. Greater Loading

Diamond Grid™ may be applied in areas where loading is greater than those listed above. In these situations, call Diamond Grid™ or an authorized representative for specific recommendations.

2. CBR

CBR is the abbreviation for California Bearing Ratio. Methods for determining CBR vary from more sophisticated laboratory methods to simple field identification methods that use hand manipulation of the soil. Diamond Grid™ does not recommend one method over the other; however, the user must have a high degree of confidence in the results produced by the chosen method.

3. Other Than CBR

If other-than-CBR soil strength values exist, use available correlation charts to relate the value to CBR.

4. Infrequent Passes

Infrequent passes means the number of passes over any period of time that causes no lasting damage to the vegetation. This number will be a function of vegetation type and age, climatic conditions, and maintenance practices. This number is not a function of the Diamond Grid™ material.

5. No Engineered Base

Concrete pavements can be installed without an engineered base for light-use applications. However, an engineer must inspect and approve the project before any work commences.

Concrete Pavements.



**For Permeable
Pavement
Continuetopage9.**

Subgrade Preparation.

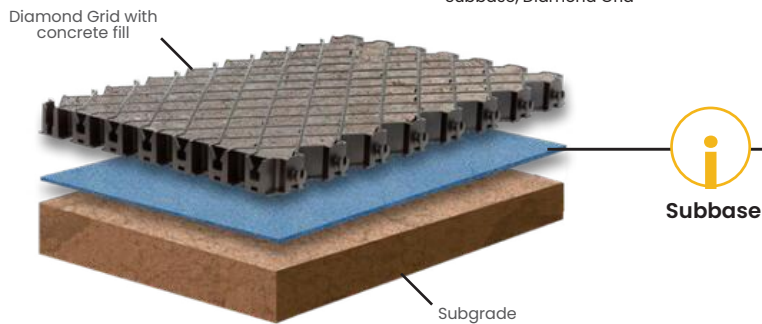
1. Ensure the surface is cleared of all loose materials to provide a stable base.
2. Address any discontinuities, such as potholes or cracks, to prevent future structural issues.
3. Utilize a grader or a Bobcat equipped with a spreader bar, finish with a roller, to achieve a uniform and compacted surface suitable for the subsequent subbase application.



Figure 1 – Subgrade Preparation: Graded Prior to compaction and levelling.

Subbase Preparation.

Figure 2 – Diagram of Subgrade, Subbase, Diamond Grid



4. Cover with road base and compact with rollers to a level 1.5" (40mm) below finish height. See Figure 4



If the site is still uneven, 0.4" (10mm) of crushed 0.2" (5mm) minus rock and fines can be spread as bedding.

This guideline is provided as general advice. For specific information regarding surface preparation, please consult with a professional engineer.

1. Less than +/- 0.50 cm variation in the plane.
2. Compaction level higher than 98% of the Modified Proctor's Maximum Dry Density.



Figure 4 – Subbase Preparation: Spreading and leveling road base prior to compaction. Compacted and watered, ready for Diamond Grid™ installation



Heavy Truck Access
Gross vehicle loads of
66,000lbs or 36T

Road base: 6-inch (150 mm) layer for subgrade CBR between 2 and 4, and a 4-inch (100 mm) layer for subgrade CBR greater than 4.



Truck Access
Gross vehicle loads of
44,000lbs or 20T.

Road base: 4-inch (100 mm) layer for subgrade CBR between 2 and 4, and a 2-inch (50 mm) layer for subgrade CBR greater than 4.



Utility & Delivery Truck
Gross vehicle loads of
22,000lbs or 10T.

2-inch (50 mm) can be compacted crushed rock/stone) layer for subgrade CBR between 2 and 4, and CBR greater than 4.



No engineered base:

Concrete pavements can be installed without an engineered base for light-use applications below. However, an engineer must inspect and approve the project before any work commences.



Cars & Pick-up Trucks
Gross vehicle loads
of 8,800 lbs or 4T.

No engineered base required.

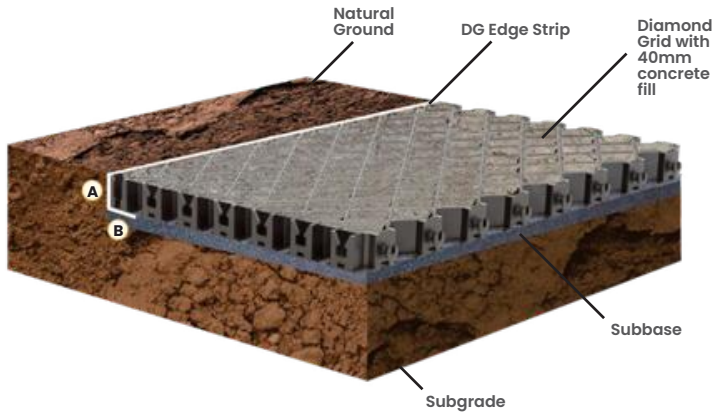


Light Use
Recreation, equestrian, motorcycle
& ATV

No engineered base required.

Edging for Standard Pavements.

Figure 5 – Edging for standard pavements using “DG Edge Strip”.



A

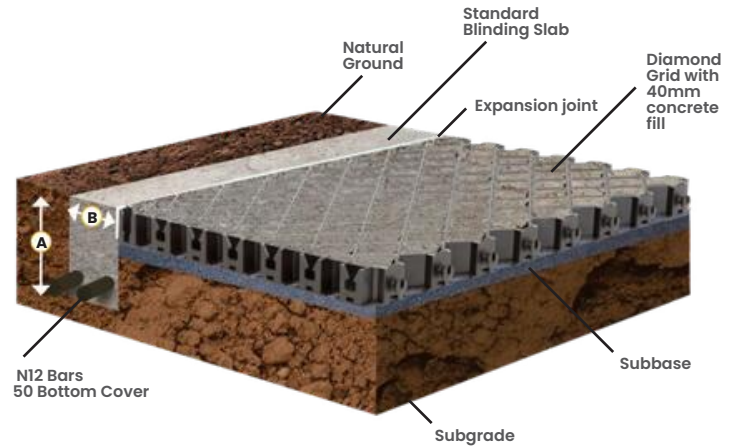
40mm

B

36mm

Edging for Heavy Duty Pavements.

Figure 6 – For pavements requiring heavy duty applications that are subjected to heavy loads, edge reinforcement through a standard blinding slab is required.



A

200mm

B

150mm

5. Secure the edges firmly to prevent movement, ensure a seamless transition with the pavement ensuring the edging is flush with the 40mm high Diamond Grid™. See Figures 5 and 6 Edge Diagrams for standard and heavy duty pavements..
6. Seal edges with a trafficable adhesive sealant after pouring to prevent water ingress. See figure 8

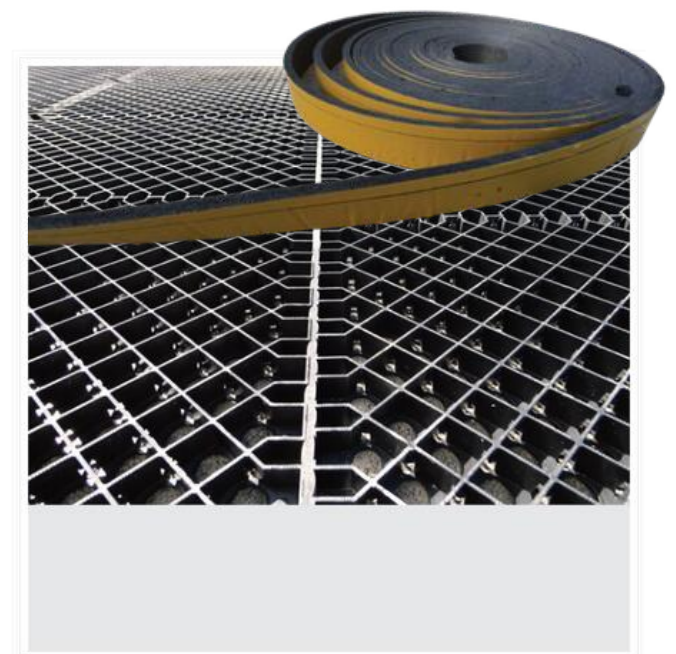
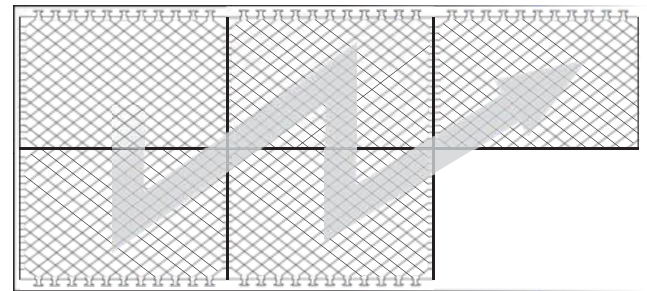


Figure 7 – Diamond Grid™ and expansion joint installation adjacent to Edge Thickening

* More information on expansion joints page 7.



Figure 8 – Seal edges with a trafficable adhesive sealant after pouring to prevent water ingress.



Concrete Fill and Finish.

Concrete Pavement Installation Guide.

Concrete Application.

- 13.** Calculate the required volume of concrete.
- 14.** Wet the subbase prior to filling, this helps to slow down the concrete drying time.
- 15.** The concrete mix design should be 30% stone – 70% sand with 180 slump 32mpa utilizing aggregate with a nominal size of 5 to 7 mm, although aggregates up to 10 mm are acceptable. Figure 13
- 16.** Spread concrete evenly over Diamond Grid, filling all spaces by hand with rakes and squeegees or vibrating screed for larger projects. Figure 14
- 17.** Work in sections, finishing using one of three options, a standard trowel machine, bull float or broom finish. Figure 16.
- 18.** Acuring compound should be applied to the slab surface once installed. Figure 17



Finish concrete not to exceed the height of the Diamond Grid figure 15



Pavement can be used after 24 hours, but for optimal curing, wait up to 5 days.



Figure 13- Concrete mix should be approx 180 slump 5 – 7mm stone up to 10mm for Easy Pouring into Diamond Grid™



Figure 14 - Spread concrete evenly over Diamond Grid, filling all spaces by hand with rakes and squeegees or vibrating screed for larger projects.



Figure 15: Finish concrete not to exceed the height of the Diamond Grid.



Figure 16: Concrete finishing work in sections, using a trowel machine.

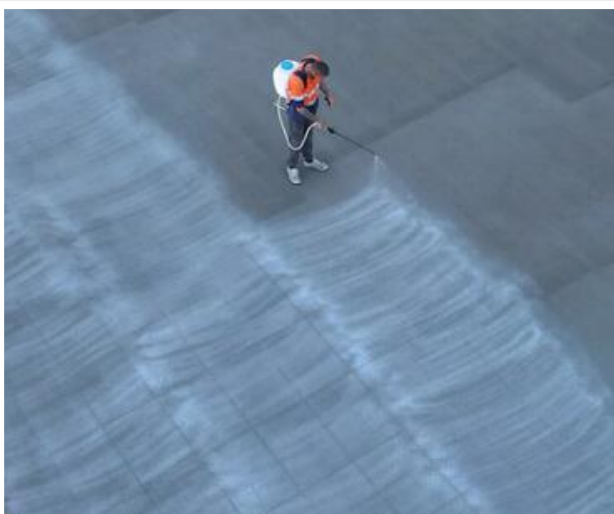


Figure 17: A curing compound should be applied to the slab surface once installed

Permeable Pavement.

Subgrade Preparation.

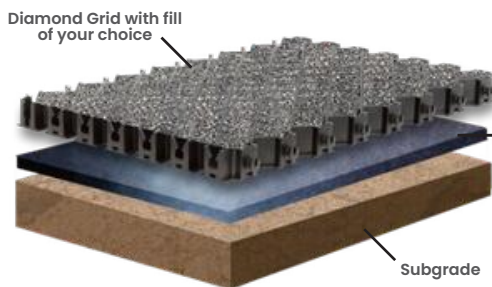
1. Ensure the surface is cleared of all loose materials to provide a stable base.
2. Address any discontinuities, such as potholes or cracks, to prevent future structural issues.
3. Utilize a grader or a Bobcat equipped with a spreader bar, finish with a roller, to achieve a uniform and compacted surface suitable for the Diamond Grid application.



Figure 17 - Subgrade Preparation: Graded and compacted.

Subbase Preparation.

Figure 17 - Permeable Unbound Pavement with engineered subbase



4. Cover with road base and compact with rollers to a level 1.5" (40mm) below finish height.



Heavy Truck Access
Gross vehicle loads of
66,000lbs or 36T

Road base: 6-inch (150 mm) layer for subgrade CBR between 2 and 4, and a 4-inch (100 mm) layer for subgrade CBR greater than 4.



Truck Access
Gross vehicle loads of
44,000lbs or 20T.

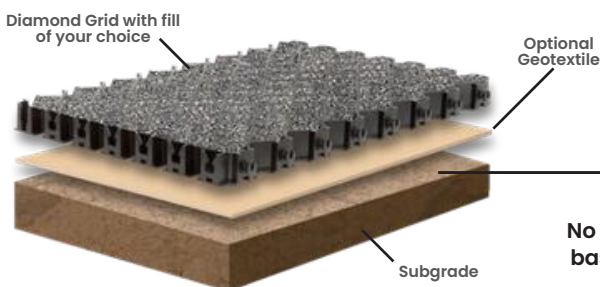
Road base: 4-inch (100 mm) layer for subgrade CBR between 2 and 4, and a 2-inch (50 mm) layer for subgrade CBR greater than 4.



Utility & Delivery Truck
Gross vehicle loads of
22,000lbs or 10T.

2-inch (50 mm can be compacted crushed rock/stone) layer for subgrade CBR between 2 and 4, and CBR greater than 4.

Figure 18 - Permeable Unbound Pavement no engineered subbase



Cars & Pick-up Trucks
Gross vehicle loads
of 8,800 lbs or 4T.

No engineered base required.



Light Use
Pedestrian, equestrian,
motorcycle & ATV

No engineered base required.



Light Traffic Permeable Unbound Pavement can be enhanced with an optional geotextile for added stability and performance.

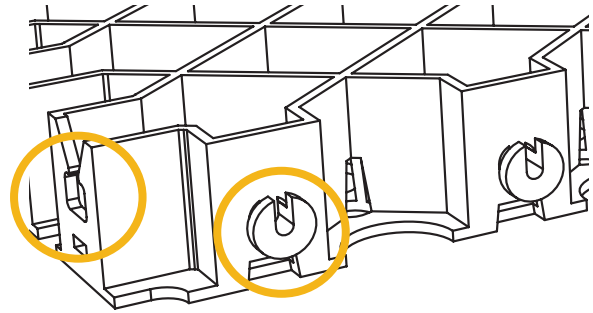
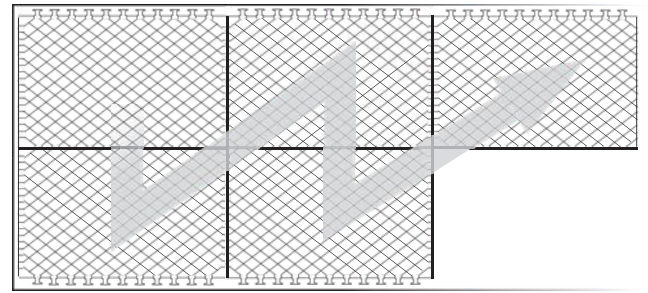


If using a Geotextile, cover with road base and compact with rollers to a level 1.5" (40mm) below finish height.



If the site is still uneven, 0.4" (10mm) of crushed 0.2" (5mm) minus rock and fines can be spread as bedding.

This guideline is provided as general advice. For specific information regarding surface preparation, please consult with a professional engineer.



Fill Application.

9. Fill the Diamond Grid™ with your choice of recommended fill materials using a skid steer and spreader bar or similar.

10. In the initial weeks post-installation, assess the pavement to verify that the grid remains completely filled. Subsequently, conduct periodic maintenance checks and replenish the grid as necessary.



Do not overfill the grid as this is likely to work against the performance of the grid.



Tipping trucks or truck and dogs are able to drive over freshly laid and empty Diamond Grid.



Figure 27 - Filling Diamond Grid with aggregate.



Figure 28 - Utilizing a skid steer (ideally with a spreader bar) to efficiently infill Diamond Grid.



Figure 29 - Use a concrete rake to help spread evenly.



Figure 30 - Make sure fill is level with Diamond Grid.



Figure 31 - Completed Diamond Grid™ permeable unbound pavement.

Handling Precautions.

Pavement Design Specifications

All pavement designs must adhere to the "Subbase Preparation Guide." This guide ensures that the pavement will perform optimally under expected loads and environmental conditions. The "Subbase Preparation Guide" is intended as a reference for ground preparation. Diamond Grid™ is not liable for any issues arising from its use. For any uncertainties, please consult your Diamond Grid™ representative.

Installation Procedures

Installation procedures must follow the guidelines outlined in the "Installation Guide." This guide provides detailed instructions to ensure that the installation is performed correctly, maintaining the integrity and durability of the pavement system. The "Installation Guide" is intended as a reference to assist with installation. Diamond Grid™ is not liable for any issues arising from its use. For any uncertainties, please consult your Diamond Grid™ representative.

Consultation and Support

If there are any uncertainties or questions during the design or installation process, it is essential to consult your Diamond Grid™ representative. They can provide expert advice and ensure that all procedures are followed accurately.

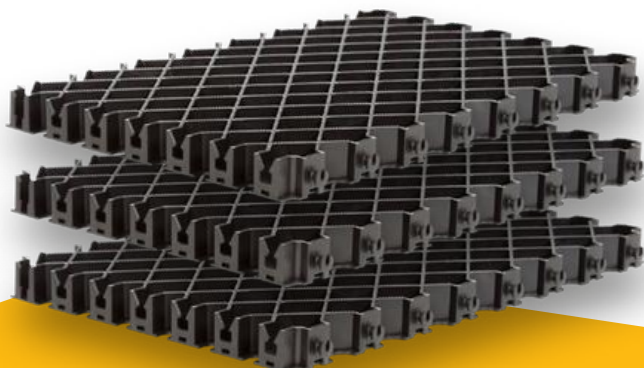
Concrete Handling Precautions

Avoid On-Site Water Addition: It is imperative to avoid adding water to the concrete on-site. Adding water can compromise the mix design and result in weaker concrete.

Edge Leveling and Compaction: Ensure that the finished edges are level with the surrounding ground. The base beneath the edges must be thoroughly compacted to prevent settlement and maintain structural integrity.



DIAMOND GRID™



Concrete Mix Designs

Importance of Mix Design

The design of concrete mixes is crucial and can vary significantly based on local conditions. A proper mix design ensures the concrete will meet the required strength and durability criteria.

Factors Influencing Mix Design

To determine the optimal mix design, contact your Diamond Grid™ representative. The mix design will be tailored based on the following factors:

Available Materials: The availability of aggregates, sands, and mixtures in the local area.

Weather Conditions: Weather conditions on the day of installation can affect the concrete curing process.

Installer Skill Level: The skill level of the installers can influence the mix design to accommodate varying levels of expertise.

Application Type: The specific application requirements, such as load-bearing capacity and exposure conditions.

Summary

Adhering to these guidelines ensures the longevity and performance of the pavement. Proper consultation, careful handling of concrete, and consideration of local conditions in mix designs are key to successful pavement installation.



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