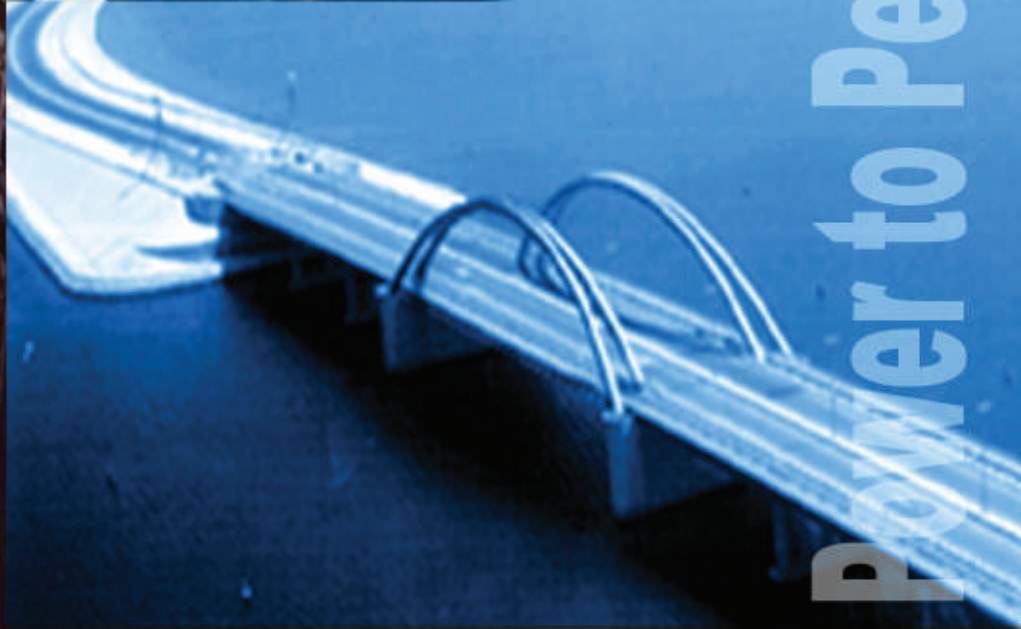


BITUMAT DESIGN AND INSTALLATION MANUAL OF BITUMAT WATERPROOFING SYSTEMS

BRIDGE DECK WATERPROOFING SYSTEM

BITUMAT COMPANY LIMITED
P.O. 7487 Dammam 31462
Kingdom of Saudi Arabia
Tel. No. (966-3) 8121210 / 81211213
Fax No. (966-3) 8121190 / 8121189
Email: marketing@bitumat.com
Website: www.bitumat.com



The Power to Perform



BITUMAT

Table of Contents

1. INTRODUCTION
 - 1.2. International Compliance and Codes of Practices
2. SCOPE
3. LIMITATIONS
4. PHYSICAL PROPERTIES
5. DELIVERY, HANDLING, PROTECTION & STORAGE
6. GUARANTEES
7. MAINTENANCE
7. THE APPLICATOR
9. PRE-INSTALLATION MEETING
10. BRIDGE DECK
 - Design Concept
11. SPECIAL CONSIDERATIONS
12. MATERIALS
 1. Bitumat Materials
 - 1.A. Polyglas
 - 1.B. Bitumat Primers
13. OTHER MATERIALS
 - A. Asphalt Wearing Course
 - B. Expansion Joints
14. BRIDGE DECKS
 1. General Requirements
 2. Condition of the Surface
 3. Preparation of Details
15. INSTALLATION
 - 15.1. General Requirements
 - 15.1.1. Storage
 - 15.1.2. Surface Cleaning
 - 15.1.3. Priming
 - 15.2. Laying the Horizontal Membrane
 - 15.3. Installation Procedure
16. DETAILS
 - 16.1. Flashings
 - 16.2. Installation
 - 16.3. Corners
 - 16.4. Edge Flashings
 - 16.5. Expansion Joints
17. MEMBRANE INSPECTION
18. PREPARATION
19. REPAIR
20. ASPHALT WEARING COURSE
21. DETAILS
22. TESTING AND SAMPLING
23. SAFETY PRECAUTIONS
24. SPECIAL CONSIDERATIONS
 - 24.1. Cold Weather Application
 - 24.2. Trouble Shooting



Bitumat Systems Design and Installation Manual

BRIDGE DECK WATERPROOFING MANUAL

1. INTRODUCTION

This manual is designed to assist and inform the designer professional, contractor or owner of BITUMAT's recommendation on Modified Bitumen Bridge Deck system and application methods, proven over time to provide superior performance. This manual contains the BITUMAT Bridge Deck System and application specifications. These specifications are based on the best available knowledge & technology.

1.2 International Compliance & Codes of Practice

All BITUMAT waterproofing material / systems comply with the applicable requirements of the following associations or standards.

- * FM Factory Mutual, USA
- * BV Bureau Veritas, France
- * UL Underwriters Laboratories Inc.,
- * NRCA National Roofing Contractors Association, USA
- * BRANZ, New Zealand
- * ASTM, USA
- * NHA, Kuwait

2. SCOPE

Scope of this manual is waterproofing membrane application over bridge decks. Only material applicable to these systems shall be used.



3. LIMITATIONS

BITUMAT as a manufacturer is not involved in the design or construction of buildings or structures. BITUMAT will under no circumstances accept responsibility for the performance of its products when damage to its products results from such things as improper bridge design, construction faults, or defects in workmanship. BITUMAT does not manufacture construct bridge decks and is not responsible for their performance.

The various systems and their uses shown within this manual are designed for a specific purpose; therefore, one system is not necessarily better than the other, and each should be utilized in its respective application according to each project's design requirements.

The design responsibility remains with the architect, engineer or owner, and construction details illustrated and described herein are furnished solely for guidance purposes. These guidelines should not be construed as being all-inclusive.

Some construction details may require special treatment to secure water tightness. Therefore, it is recommended that these details are brought to the attention of the manufacturer prior to design. BITUMAT suggests that designers and architects refer to the BITUMAT Technical Department prior and during the design of any waterproofing system.

4. PHYSICAL PROPERTIES

The typical properties of Bitumat products as stated in the Product data sheets are typical median values and are within normal tolerance limits as stated in the UEAtc and other relevant standards, and may vary under normal manufacturing procedures as such and subject to change without notice.

5. DELIVERY, HANDLING AND STORAGE

All BITUMAT products are designed for application under specific conditions. Improper handling at any stage can alter the properties of the product. All BITUMAT membranes and other products are transported on wooden pallets, shrink wrapped for best protection. Unload and handle all waterproofing materials with care. Examine all materials as they are received. All Bitumat products display legible labels identifying the material.

Look for any damaged or defective material and notify the carrier and manufacturer. Do not expose material to moisture in any form before, during or after delivery to site. Usage of wet or damaged material can contribute to failure of the waterproofing system.

Always store roll goods on end on a clean, raised platform to keep the ends of the rolls free from foreign matter. Rolls stored on their sides will flatten and stick together, making them very difficult to apply and then may cause problems later. Take care to prevent damage to roll ends or ridges. Do not double stack modified bitumen products. Store all waterproofing materials in a dry shaded and properly ventilated area.

Keep the temperature above 5°C (41°F) for 24 hours prior to application. Modified bitumen membranes are considerably easy to in-stall when maintained at temperatures above 11°C (51.8° F).

When application of membrane occurs at low ambient temperatures, care should be taken that the rolls are not thrown on the deck or storage area. Sudden impact of the roll can cause cracking of the rolls.

It is suggested to use "breathable type covers such as canvas tarpaulins to allow venting and protection from the weather and moisture. Thus the possibility of rolls sticking is eliminated.

6. GUARANTEES

BITUMAT Company Limited guarantees on BITUMAT material are available only when the BITUMAT membranes are installed in accordance with the installation guidelines set forth in this manual, and by a BITUMAT approved contractor who owns a written approval from BITUMAT Co. Ltd to install the BITUMAT material.

7. MAINTENANCE

BITUMAT does not use or maintain the bridge deck and shall not be responsible for its routine maintenance and care. Since BITUMAT has no control over a building's



contents, type, quantity, positioning or protection, BITUMAT shall not be responsible for any consequential damages in case of bridge deck failure. BITUMAT strongly recommends annual inspection and preventive maintenance to prolong the life of the system.

8. THE APPLICATOR

BITUMAT recommends prequalification of the applicator. A professional contractor must have the following:

- A permanent place of business.
- Official registration documents.
- Knowledge of bridge deck systems.
- Good track record of application.
- Affiliated with a major waterproofing products manufacturer. Since good workmanship is essential, qualified supervision of the application should be exercised. The applicator has the sole responsibility for the quality of the application of the bridge deck system.



9. PRE-INSTALLATION MEETING

A meeting between all parties concerned should be organized on site prior to installing any waterproofing materials, to approve the readiness of the bridge deck surfaces and details of the design.

BITUMAT strongly recommends that the above procedure must be followed to avoid misinterpretation and to ensure proper installation of the system. Agreement shall be reached on all points.

10. BRIDGE DECK

Bridge decks must conform to internationally recognized standards. They must be designed to support all live and dead loads without excessive movements. Provisions for expansion and contraction shall be made to protect the integrity of the structural system and the waterproofing membrane. Negative slope shall not be permitted.

Precast concrete elements must form an unbroken surface. Open joints between sections must be grouted and made level. Cambers and deflections shall be within PCU code tolerance. Precast, prestressed concrete shall preferably be topped with cast-in-place concrete screed.





Design Concepts :

The permeable nature of road surfacing materials permits water to penetrate to the level of the deck. If the water is not checked at this level, penetration of the slab can occur and can lead to the following;

- Corrosion of reinforcement
- Chemical attack of the concrete
- Staining of abutment -faces
- Formation of "stalactites"
- Damage caused by salted dew in coastal areas

These will effect the planned service life of the structure and greatly increase maintenance costs when the bridge is in operation. It is essential that the membrane used for water proofing bridge decks shall have the following properties:

- Flexibility at all ambient temperatures
- Ability to withstand trafficking prior and after application of surface finishes.
- The surfacing must bond to the membrane in order the breaking forces do not cause relative movement between the deck and surfacing.

BITUMAT Bridge Deck Waterproofing System has been specifically designed to face these particular stresses. The base of the system consists of Polyglas, a modified bitumen torchable membrane with double reinforcement, fully bonded by gas torch to the primed deck, and able to receive directly the asphalt wearing course.

11. SPECIAL CONSIDERATIONS

BITUMAT Bridge Deck Waterproofing System is applied only on concrete bridge decks. For other application see the relevant Design and Installation Manual.

Proper Installation of any waterproofing system requires professional supervision and skilled manpower. The safest way is to insist on a professional waterproofing contractor.

The Asphalt Wearing Course, being laid directly onto the BITUMAT Waterproofing membrane, should be installed with care by a well informed road contractor, in order to avoid physical damages to the membrane.

12. MATERIALS

1.) BITUMAT Materials

1a. Polyglas

Polyglas is a waterproofing membrane made of APP Modified bitumen with a 180gm/m² non-woven polyester mat and a 60 gm/m² non-woven glass fiber reinforcement, black finish on the top side and having a thin torch-off polyethylene foil permanently fixed to the under side.

Nominal thickness : 4mm
Nominal Roll Size : 10Mx1M

1b. BITUMAT Primers

BITUMAT Concrete Primer, Bituprime and Bitufast are solvent based, cold applied bituminous primer,

designed to penetrate concrete and provide a bondable surface.

Bitufast, being a very fast drying primer is to be used when site conditions do not allow for 24 hours curing of the priming coat.

Packing : 20 Liters pail
200 Liters drums

Standard : ASTM D 41

13. OTHER MATERIALS

a.) Asphalt Wearing Course

- The asphalt wearing course shall correspond to the Class "A" mix design as outlined by the Ministry of Communication Standard MRDTM 410 (in Saudi Arabia) or any suitable and competent authority.

- Non-bitumen based wearing course, (coat tar,) are not allowed.

b.) Expansion Joint

Expansion joint covering shall be custom designed to face the specific stresses expected, and be compatible with BITUMAT APP Modified bitumen membranes, such as waboflex or LM 50 from Bitumat Serviced Systems. A specific survey is to be carried out on a case per case basis for design of the joint size and requirements.

14. BRIDGE DECKS

1.) General Requirements

a.) Bridge decks must conform to internationally applicable standards, and in particular must comply with the Ministry of Communications "General specifications -for Road and Bridge Construction".

b.) Bridge deck shall be designed to support all live and dead loads without excessive movements. Provision for expansion and contraction shall be made to protect the integrity of the structural system and the waterproofing membrane. Negative slopes shall not be permitted.

c.) Precast concrete elements must form an unbroken surface. Open joints between sections must be grouted and made level. Cambers and deflection shall be within PCI Code tolerance.

Precast, pre stressed concrete shall be topped with cast-in-place concrete screed.



2.) Condition of the Surfaces

The deck surface finish is of extreme importance as air pockets entrapped beneath the membrane may create membrane blistering and "elastic mattress" on which the asphalt wearing course cannot be properly compacted. Hence, the surface finish shall be smooth and free from any high spots and any depressions greater than 5mm. If necessary, leveling can be done by using a mechanical grinder (for spots) and/or epoxy mortar (for depressions).

Concrete decks or other components should be cured and dried for the required time before the installation of the waterproofing membrane.

Moisture entrapped beneath the membrane may create membrane blistering. Hence the Dryness of the deck shall be checked carefully before membrane application. It is strongly suggested that the applicator try out a sample application to ensure that suitable bonding is being achieved.

Care should be taken to ensure that no blisters are either being made due to "rapid application" or due to moisture (present in the deck) evaporation. Curing compound containing wax or oil should be prohibited.

In Saudi Arabia, they must conform to Ministry of Communications "General Specifications for Road and Bridge Construction", in particular with chapter 4.01, para D2 and chapter 5.01, para D9 and D10.

3.) Preparation of Details

- A 7x7 cm mortar cant strip shall be provided at all wall / slab connection.

- All external angles shall be chamfered.

- Curbs and/or parapets should be designed to provide adequate termination points for the waterproofing membrane.

- All bridge structural details (expansion joints, drains, penetrations) shall be completed prior to installing any waterproofing membrane. Particular attention should be paid to their design which should be done with the cooperation of a Professional Waterproofing Contractor.



4.) Inspection Visit

- A meeting between all parties concerned should be organized on site prior to installing any waterproofing membrane, to approve the preparation of the concrete surfaces and the design of the details of the bridge.

- We strongly recommend to follow the above procedure to avoid misinterpretation and ensure proper installation of the waterproofing system.

15. INSTALLATION

15.1. General Requirements

15.1.1. Storage



BITUMAT APP Modified bitumen rolls shall be stored vertically on ends, on a flat surface, one high without super positioning, in a dry ventilated room. Rolls shall not be laid flat until ready for installation.

15.1.2. Surface Cleaning

The Bridge deck concrete surface shall be clean and free from laitance, loose aggregates, dust and any other debris. Oil, grease, curing compounds shall be washed out if necessary.

15.1.3. Priming

Immediately after cleaning and drying of the surface, a full coat of BITUMAT Concrete Primer, Bituprime or Bitufast is to be applied over all the deck and any detail on which waterproofing membrane is to be applied. The primer shall be well brushed in to avoid ponding in any depression of the deck. Depending upon concrete surface condition, application rate varies from 0.2 to 0.4 LT/M². Primer coat shall be allowed to cure completely before membrane application (12-24 hours).

16. LAYING OF THE HORIZONTAL MEMBRANE

• Membrane rolls shall be laid parallel to the traffic direction.

• Installation starting shall be done at the low edge (downhill) of the deck to ensure that water will drain away from the exposed edges.

• In case of curved bridge, the rolls may be cut in shorter length, laid tangent to the curve in such a manner that overlaps are never less than the specified value.

• The rolls end laps must be staggered so that at no point they should be more than 3 thicknesses of membrane.

• Membrane shall be installed with 10 cm side laps and 15 cm staggered end laps.

• The membrane should be free of wrinkle and footmarks. Only light shoes with flat soles shall be worn by installation crew, and traffic on the membrane should be very limited while it is still hot.

16. 1. Installation Procedure

- Starting at the edge of the bridge deck the Polyglas membrane rolls shall be opened and properly aligned. The membrane should be free of wrinkles and

positioned to achieve the proper 10cm side lap and 15 cm end lap.

- The roll will then be rolled back up to the middle and the butane torch flame shall be applied to the whole width of the roll until the surface reaches the proper application temperature (generally 200 Deg.C.) giving a slight sheen, burning of the polyethylene foil. A small wave of melted bitumen is created at the base of the roll in contact with the primed deck.

- The BITUMAT membrane roll is then gradually unrolled to create a heat weld between the membrane and the primed concrete deck over which it is being installed.

- When this section of the roll has been securely installed, re-roll the rest of the membrane up to the point of application and begin heat welding in the opposite direction. If more than one roll is required to complete the starter course, lap ends 15cm.



- Continue installing additional rolls in shingle fashion with 10cm side laps and 15cm end laps, which must be staggered.

- Seams at overlaps shall be checked for proper weld by running a heated trowel along the edge of the seam to re-seal all voids in the laps. Seal all edges with the heated trowel by slightly melting the modified bitumen compound evenly creating a fully welded seam.

- After covering the whole deck area, recheck to ensure that the membrane is fully heat welded at all laps and around the perimeter and all vertical protrusions.

16.2. Details

16.2.1. Flashings

General Rules

- The top of the membrane base flashing must be higher than the finished road level by at least 100mm.

- The upper horizontal joint of the base flashing strip must be protected by a counter flashing system (metal strip, reglet, groove or drip in concrete.).
- The membrane base flashing shall be protected against accidental damages.
- Mortar cant strips shall be provided at all wall and curb type protrusion flashings, except where there is no stress expected.
- Protrusions shall be at least 50cm away from curbs, walls and edges to provide adequate space for proper flashing.
- BITUMAT Membrane flashing shall be installed in strips not longer than 1 meter and cut to the width required for the flashing girth.

16.2.2. Installation

- Align flashing strips, pre-cut in the proper width according to the height required, with the top level of wall flashing. Hold the Flashing strip at cant strip level, turning down the top portion of the flashing strip. Apply the butane flame carefully to the surface of the wall and the inner surface of flashing strip and press well to ensure complete bond along the wall for the whole 1 meter length of strip.
- Turning the bottom portion of the flashing strip up, apply the flame to the membrane over the cant strip. Approximately 10 cm onto the flat area as well as the inner side of the flashing strip. Press the strip carefully onto the cant strip and the membrane eliminating any voids between them and avoiding any loose installation at the flashing point.
- Seal all seams and edges with the heated trowel running it along all joints. Overheating and over melting of surface bitumen must be avoided.
- Continue installing additional flashing strips with 10 cm overlaps fully torched and seamed. Flashing strips side laps and horizontal membrane side laps shall not be super imposed.

16.2.3. Corners

All external and internal corners shall be cut and shaped using a second reinforcing piece at the central joint, and shall be fully heat welded with re sealed edges and seams as the rest of the flashing.

16.2.4. Edge Flashing:

In case of flat edges, BITUMAT Membrane will be stopped at the extreme corner, and a reinforcing strip will be installed, below or under the main membrane depending upon slope.

16.2.5. Expansion Joints

It is necessary to ensure continuity of the waterproofing over all movement joints. The mechanical bridging should be capable of accommodating the following:

1. The imposed loading from traffic.
2. The accumulative range of movements imposed by:
 - Creep and shrinkage
 - Expansion and contraction caused by temperature cycles
 - Rotation caused by deflection under loading
 - Braking forces transmitted to deck structure
 - Elastic shortening due to pre-stress.

3. Good skid resistant wearing surface at road level.

Depending upon the expected movement. Bridge expansion jointing system shall be designed on a case-per-case basis. Care will be taken to specify a joint system ensuring continuity with the Polyglas waterproofing membrane, such as Waboflex SR expansion joints manufactured by Bitumat Serviced Systems.

(see enclosed construction details)

16.2.6. Covering

16.2.6.1. Membrane Inspection

- Unlike roofing works, flood test is not practical in most waterproofing cases. Therefore, a thorough visual inspection of all membrane installation is necessary before covering.
- The full membrane area, including all overlaps, terminations, flashings and other details must be carefully checked for any evidence of incomplete adhesion, physical damage or other conditions that may be detrimental to the watertight integrity of the membrane.
- Possible accidental damages, voids or blisters shall be repaired according to the following procedure:

16.2.6.2. Preparation

- For accidental damages; Cleaning of the area, torching of loose or open part, smoothing of the damaged area with a heated trowel.
- For voids and blisters: Opening of the void in a X shape, drying by torch of the opened area, re-bonding of the membrane by torch, smoothing the cuts with a heated trowel.

17.0. Repair

Damaged or cut area is covered with a torched patch of Polyglas, square or rectangular shape, overlapping on all sides on 10cm out of the cut/damaged area. Sides of the patch are seamed with a heated trowel as all overlaps. Waterproofing membranes should never be left exposed to the weather and possible abuse from other trades for any length of time after they have been properly inspected and completed. Hence, Polyglas installation shall be scheduled so that asphalt wearing course can be laid immediately after waterproofing works.

18.0. Asphalt Wearing Course

- The asphalt wearing course shall comply with para 2.2.1. recommendations. The nominal thickness

requested to ensure sufficient protection of the BITUMAT membrane is 4cm after compacting.

- The laying of the asphalt wearing course shall be done on a dry and clean surface.
- Its temperature shall not exceed: 160 Deg.C. when laid onto the BITUMAT membrane, 140 Deg.C. at the start of compacting.
- The access to the non protected membrane shall be strictly restricted. Only trucks and vehicles involved in the asphalt wearing course laying shall be permitted. They shall be equipped with rubber tyres and shall avoid brutal maneuver.
- The laying of the asphalt wearing course shall be done with care by a well informed asphalt contractor in order to avoid mechanical damages to the waterproofing membrane.

19.0. Details

Some specific parts of the bridge deck (side walk, road dividers,...) may not receive asphalt wearing course but concrete screed, precast pavers or other top covering.

In such cases, the top covering shall not be laid directly onto the membrane. An adequate separation layer, 2mm BITUMAT Bitutect III shall be laid on the membrane prior to any covering.

20.0. Testing and Sampling

Quality Control and/or Handing over procedure may necessitate cut of asphalt wearing course samples for laboratory analysis.

While extracting the sample, care should be taken not to damage the waterproofing membrane and roll owing procedure shall be observed:

20.1. Prior to asphalt wearing course laying, sample cut places shall be marked by the Consultant Engineer and identified in relation with fixed elements (street light poles, rails,)

20.2. At these places, the waterproofing membrane is covered by a 50x50cm aluminum foil.

20.3. After laying, compacting and curing of the asphalt wearing course, 35 x 35 cm samples are cut at the marked places. Special attention shall be paid to protect the integrity of the waterproofing membrane.

20.4. Opened spaces shall be filled with asphalt wearing course and carefully compacted.

21.0. Safety Precautions





- Work Safely by Working Smart! When in Doubt... Do not use! Prevention is better than cure! NEVER LEAVE A TORCH UNATTENDED!

As with any construction process, safety is key element. Therefore, BITUMAT recommends that all applicable safety standards and good waterproofing practices be followed. Fire ignition prevention is the applicator's responsibility.

Contact with molten asphalt and torch flame may cause burns. In case of contact with molten bitumen, apply ice or any other applicable cold liquid that is compatible with the skin and call for medical care immediately.

Torching devices should not be left unattended and should not be allowed to get in touch with flammable materials. Torch flames should be kept moving and properly monitored all the time. Keeping the torch flame directed towards one area for any period of time may result in ignition with surface or other flammable material.

Don't torch anything that cannot be seen. Don't torch near gas lines, electrical wires or flammable vents. Follow the torch manufacturer's safety precautions prior to using the torching tools. All fittings for application tools must be thoroughly checked prior to starting the application process.

Propane torch should not be used except in properly ventilated areas. Application staff must remain on site at least one hour after completion of installation to inspect for any possible flames, smoke, or smolders of any combustible material.



- Do not use trowel or other tools as a torch stand.
- Do not use cigarette lighter or matches for test for leaks.
- Do not keep the fire extinguisher next to LP tank.
- Do not use hoses which are old and worn out.
- Always check the equipments for safety before starting work.
- Always wear the proper dress, wearing full sleeves overalls only.
- Always use soap solution to check for gas leaks before lighting.
- Always keep a bucket of cold water handy in case of burns.
- Conduct a safety drill on a frequent basis.
- There should be a trained first aide provider on site who is familiar with the first aid procedures.
- If working with scaffolding, ensure the sturdiness and proper placement
- Ensure safety of the side rails on the roof.
- Always be alert to the site surroundings.

22.0. Special Consideration

22.1. Cold Weather Application

Waterproofing materials cannot be applied unless correct asphalt application temperatures can be maintained. Membrane application shall not be continued during very cold weather conditions.



A.) When water in any form is present on the deck, application procedures must be suspended until the deck has dried. Any moisture present at the time the waterproofing is applied may result in poor adhesion and blistering of the membrane.

B.) Store membrane rolls and coatings in an area heated at a minimum temperature of 55°F (12.6°C) when the ambient temperature and wind chill factor is below 45°F (7.1°C). This will help in the ease of application, and reduce the potential of membrane coating cracking during their handling and application.

C.) Install membrane rolls immediately after removal from storage to avoid membrane cooling to below 45°F (7.1°C).

D.) During installation, if surface cracking appears in the membrane, discontinue installation immediately and contact Bitumat technical Dept.

E.) If temperatures at night are at or below 45°F (7.1°C), never start applying first thing in the morning. The surface over which the membrane is to be installed must be allowed to warm to a temperature above 55°F (12.6°C).

F.) On those days when ambient temperature is greater than 55°F (12.6°C), remove from the protected storage area only those roll that will be installed the same day. These rolls must be unrolled, with the back side up and allowed to relax and warm. Then re-roll to apply. If the outside temperature is less than 55°F (12.6°C), then remove only those rolls that can be applied immediately.

G.) Do not apply waterproofing materials when the ambient temperature and wind chill factor is below 45°F (7.1°C) unless the following recommendations for application during cold weather are followed:

22.2. Waterproofing installation at temperatures below 45°F (7.1°C) require special precautions to insure satisfactory performance of the finished roof. Remove all traces of moisture from the deck before waterproofing.

22.3. Do not overheat APP membranes to compensate for cold temperatures.

22.4. When torching, unroll the membrane slowly to ensure proper flow of the coating.

22.5 Never throw rolls of membrane on the deck or storage surface. Sudden impact of the roll can possibly cause cracking of the coating.

23.0. Trouble Shooting

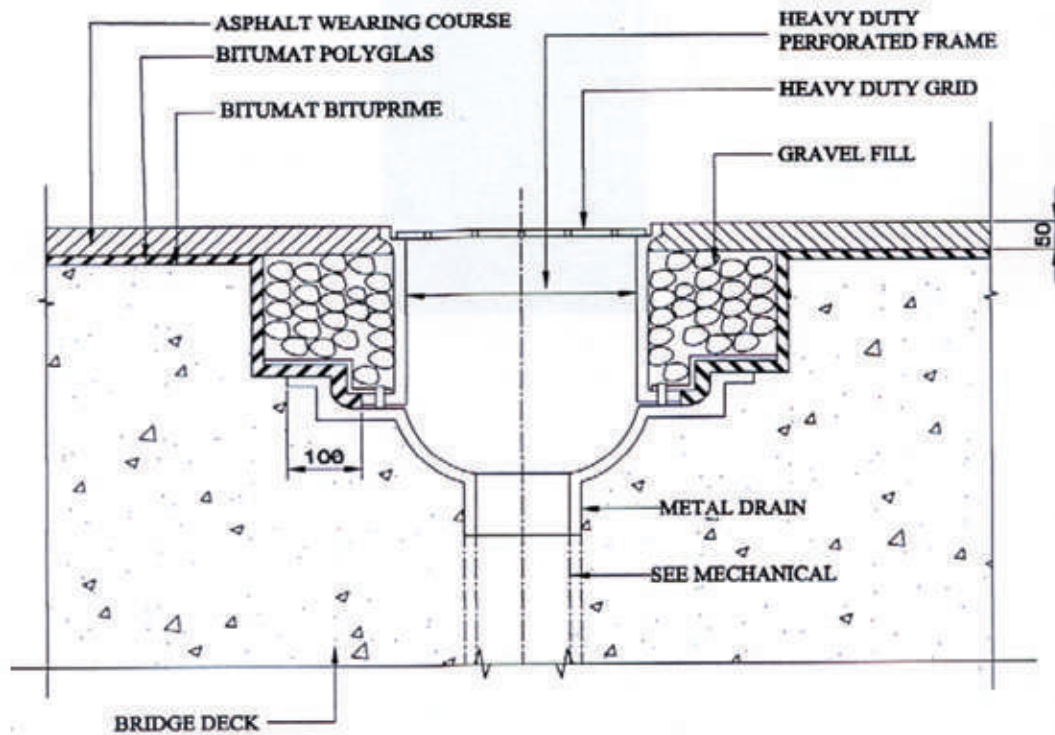
- Never start work if the deck is not satisfactory
- Ensure that there is positive slope on the deck, with no possibility of water ponding.
- Never start work if the deck is not fully dried
- Never use material which is wet or damaged
- Avoid exposing materials to moisture in any form before, during or after delivery to the site
- Always store goods on end in a clean, dry and ventilated area.
- Avoid storing materials at temperatures below 55 deg F (12.6 deg C)
- Do not begin work when inclement weather is forecast to occur prior to the anticipated time of completion of the work item
- Do not install materials during inclement weather, except for temporary work necessary to protect installation.
- Do not apply the membrane if the ambient temperature is below 45 deg F (7.1 deg C).
- During cold weather never throw rolls of membrane on the deck or storage area.
- Always insist on a pre application conference with all the concerned parties.
- Always "relax" the membrane prior to torching.

- Special care to be exercised when torching, avoiding both under and over torching.
- Always start installation of membranes at the low point or drains, so that the flow of water is over or parallel to the plies BUT NEVER AGAINST THE LAPS.
- Ensure staggering of laps when doing a two layer system, laps never coinciding.
- Appropriate precautions to be taken when torching on site.
- Ensure proper seam integrity by rolling over the laps.
- Flashing is the most common of waterproofing failure, ensure that the flashing is properly designed and installed.
- Never install base flashing on fresh plaster. It will lead to wrinkling and buckling.
- Maintain the right amount of overlaps and the length of the flashing should not be unmanageable.
- Ensure proper protection of the membrane
- Cover immediately to avoid any damage.
- Insist on proper safety programme on the site.

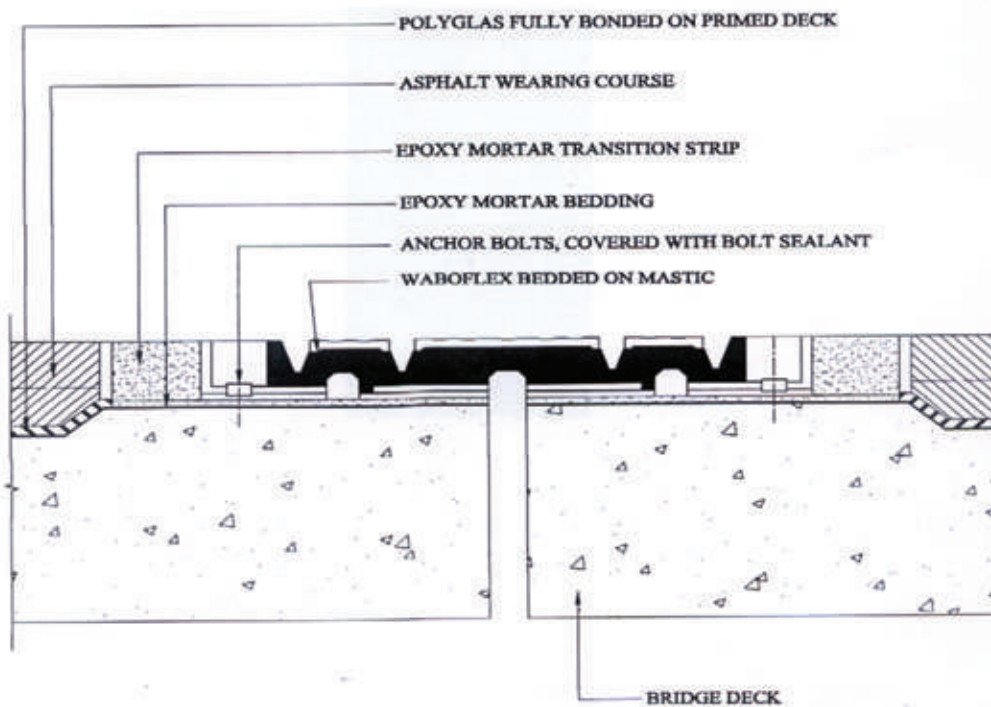




BRIDGE DECK WATERPROOFING SYSTEM

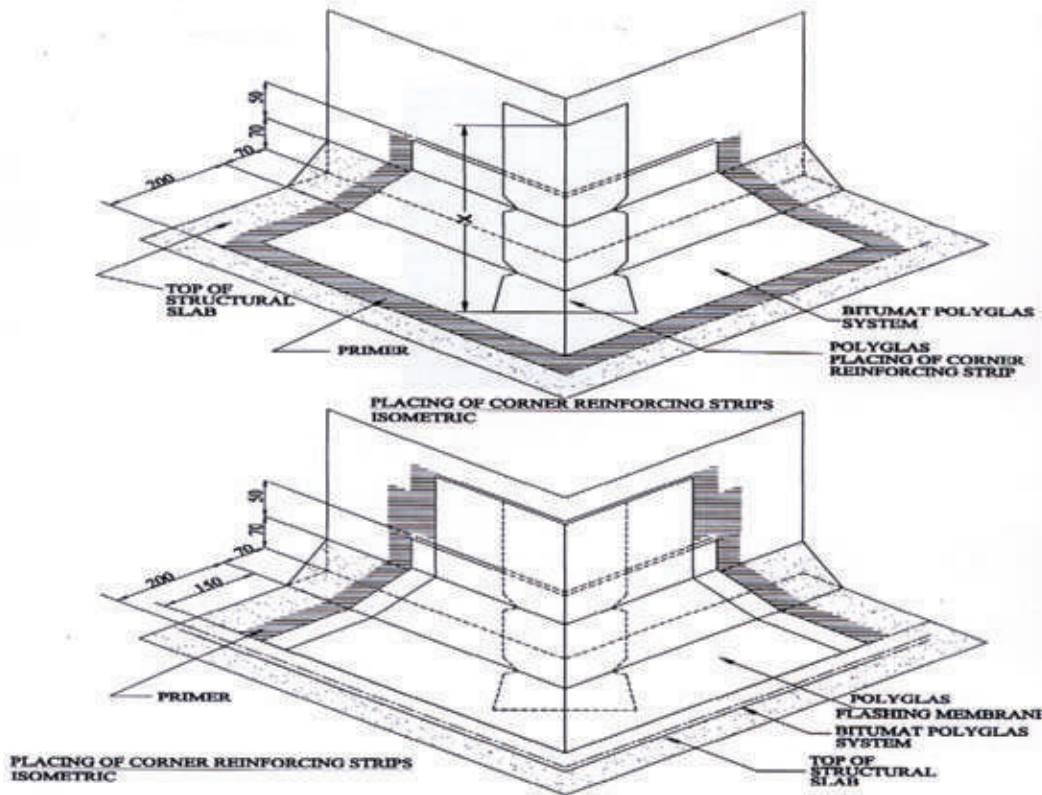


DRAINS

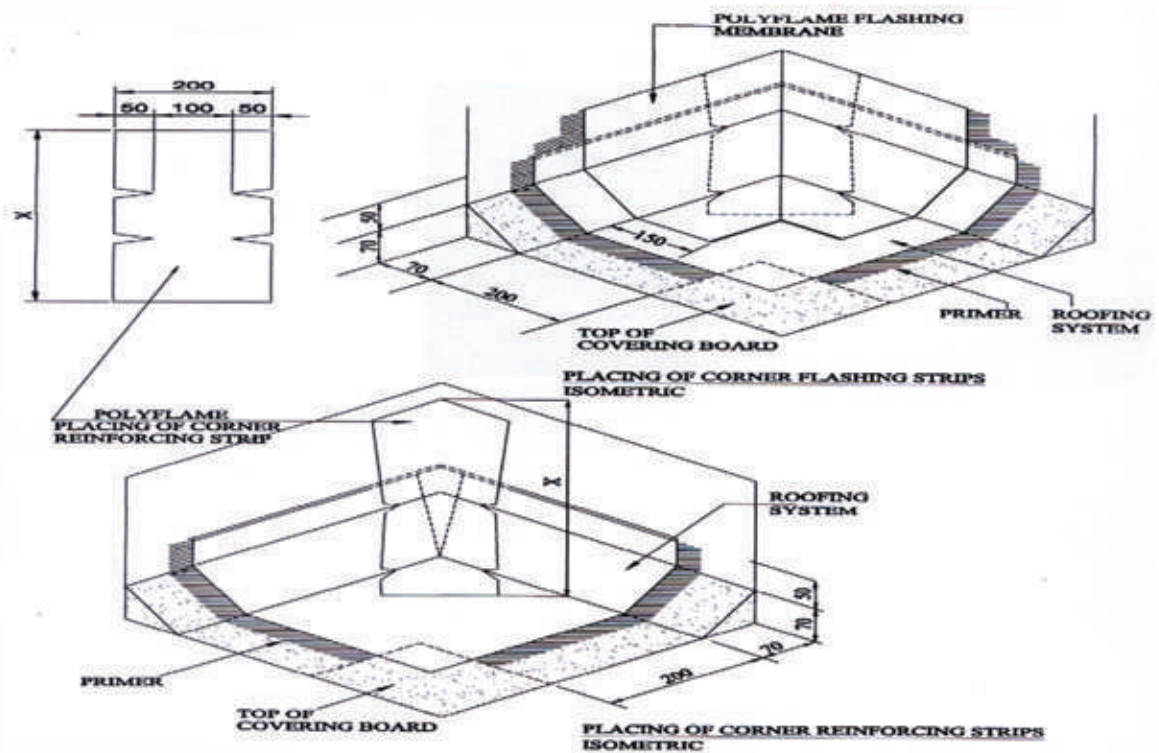


EXPANSION JOINTS

BRIDGE DECK WATERPROOFING SYSTEM



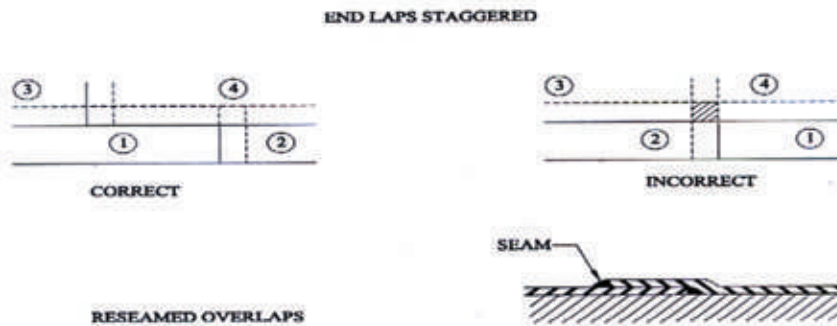
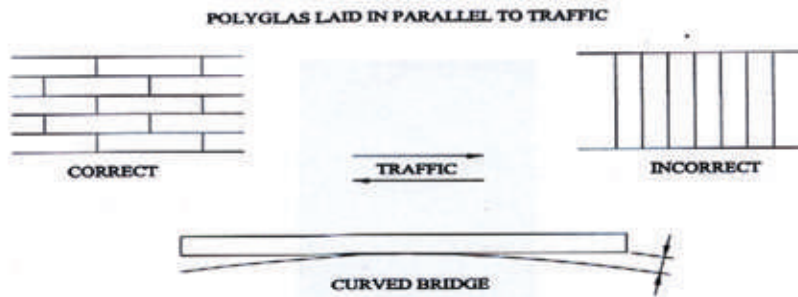
EXTERNAL CORNERS



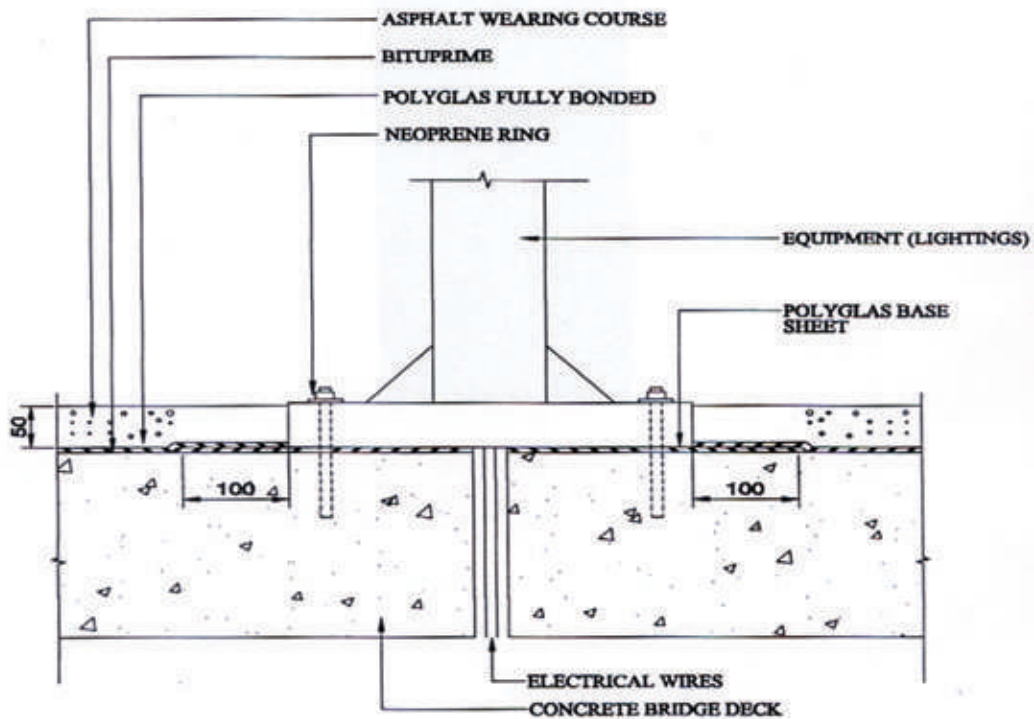
INTERNAL CORNERS



BRIDGE DECK WATERPROOFING SYSTEM

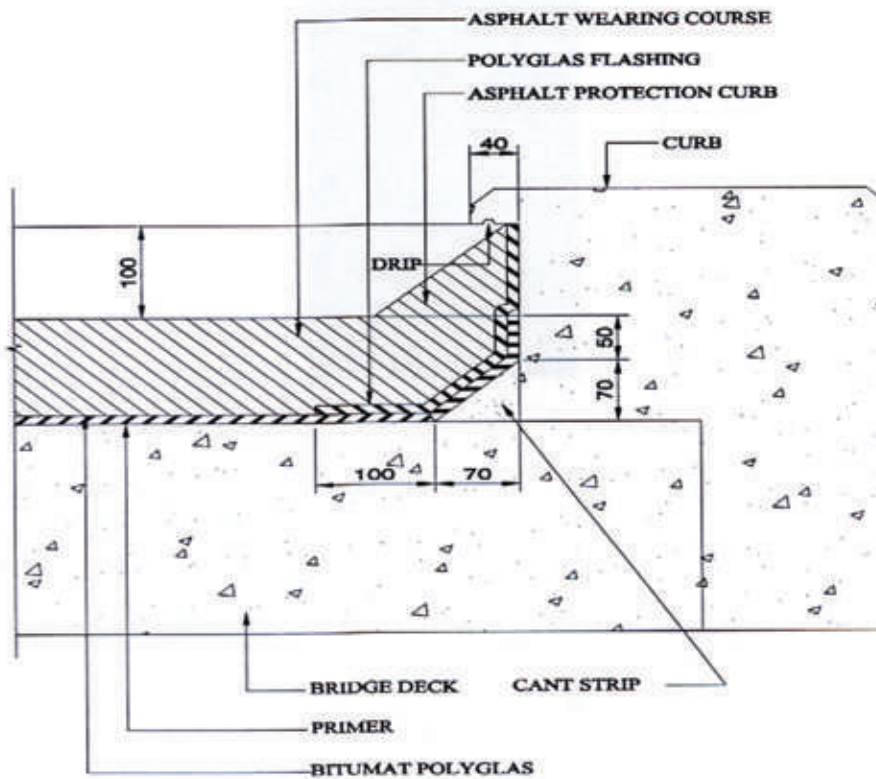


MEMBRANE LAYOUT

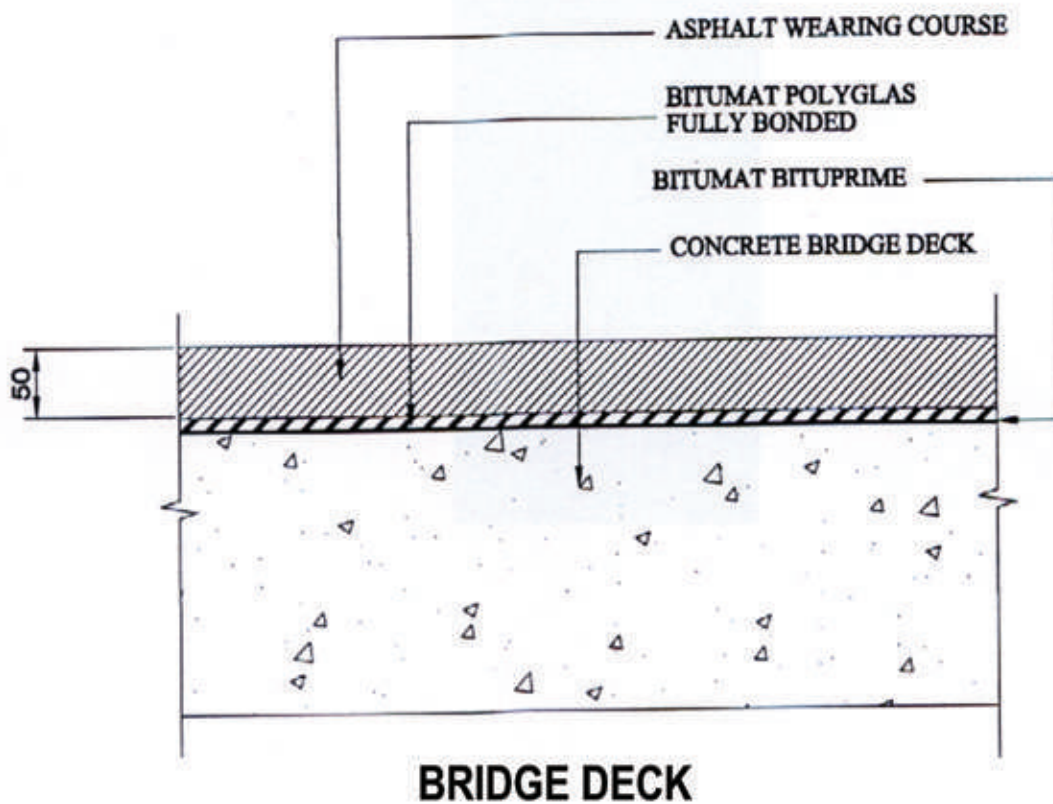


PENETRATIONS

BRIDGE DECK WATERPROOFING SYSTEM



TYPICAL FLASHING



BRIDGE DECK